



Wastewater Treatment Plant Plant Capacity Evaluation

Town of Warrenton, VA

Department of Utilities

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TOWN OF WARRENTON WASTEWATER TREATMENT PLANT CAPACITY EVALUATION

EXECUTIVE SUMMARY

The Town's existing wastewater treatment plant is rated and permitted for 2.5 million gallons per day (MGD) average daily flow (ADF). The plant has undergone several upgrades and expansions since its original construction in the 1950's. Currently, secondary biological treatment is provided by a conventional trickling filter (TF) and a Rotating Biological Contractor (RBC) process which also provides for the required ammonia removal. The most recent major plant upgrade was for Nutrient Removal (total nitrogen and phosphorus reduction) in 2007 – 2009 as part of the Chesapeake Bay Restoration Program.

While the plant has historically performed well, the secondary biological treatment facilities (TF and RBC) are approaching their useful service life and as plant flows may expect to increase in the future, the Town sought to review the current treatment technology and identify improvements to extend the facility's service life and maintain reliable treatment performance.

As such, WRA prepared a Preliminary Engineering report (PER) in July 2016 which recommended the "Moving Bed Bio-Reactor" (MBBR) process as replacement for the TF/RBC process. The MBBR is a newer and more efficient technology that combines the functions of the trickling filter and RBCs into one process tank. In addition, this new process can be readily expanded to handle additional flows and wastewater loads. The design of the MBBR process is now underway with construction expected to begin in the summer of 2017.

As plant flows have gradually increased over the past decade, with monthly average flows sometimes approaching 80-90% of the permitted capacity, the Town has recognized the need to assess the reliable treatment capacity of the existing facilities and, if the treatment capacity can be expanded, what upgrades would be required. The capacity assessment would take into consideration the planned MBBR facilities.

For planning purposes, the Town anticipates the need for an additional 0.50 MGD (20% increase) capacity above the current rated capacity.

This report provides a capacity evaluation of the existing facilities and the upgrades needed to expand and re-rate the treatment capacity to 3.0 MGD average daily flow. In summary, upgrades would include:

- Increase in MBBR tank volume and additional media
- Improvements to the existing Trickling Filter for peak flow storage
- Various yardpiping hydraulic capacity Improvements
- Upgrades to existing Digester No. 2
- Dewatered sludge storage expansion

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1 BACKGROUND

The Town of Warrenton owns and operates an advanced wastewater treatment plant currently permitted for 2.5 million gallons per day (MGD). The original plant was constructed in the late 1950's as a single stage 0.5 MGD trickling filter plant followed by an expansion to 1.0 MGD in 1978. A major plant upgrade and further expansion was completed in 1990 to provide a total of 2.5 MGD treatment capacity and to meet effluent limits for Total Kjeldahl Nitrogen (TKN). A rotating biological contactor (RBC) process was added to expand and improve the biological treatment, including a new primary and secondary clarifier. New solids handling facilities were also constructed, including sludge thickening, anaerobic digestion and sludge dewatering. Later, in 1998 the plant was modified again to achieve compliance with effluent ammonia-nitrogen limits by upgrading the RBC units. In 2007, the plant's gas chlorine disinfection system was replaced with a UV-disinfection system, followed by a facility upgrade to comply with nutrient reduction requirements for nitrogen and phosphorus through the Virginia Water Quality Improvement Fund as part of the Chesapeake Bay Restoration program. The plant operates under VPDES permit No. VA0021172, included in **Appendix A**.

The plant has historically performed well and has consistently complied with its effluent permit limits for BOD₅, TSS, ammonia and bacteria (E.coli). In addition, the plant has met nutrient removal requirements for total nitrogen and total phosphorus since the last major plant upgrade in 2007. A single stage trickling filter and conventional rotating biological contactors (RBC) provide for organic (BOD) removal and nitrification (ammonia removal), respectively. As these facilities are approaching their useful service life and as plant flows may expect to increase in the future, the Town sought to review the current treatment technology and identify improvements to extend the facility's service life and maintain reliable treatment performance, both at current and future flows.

At the Town's request, WRA prepared a Preliminary Engineering Report (PER) in July 2016. This report recommended a replacement of the existing trickling filter/RBC biological treatment process with the "Moving Bed Bio-Reactor" (MBBR) process, a newer technology that combines BOD removal and nitrification into one process tank. Similar to the trickling filter/RBC, the MBBR is an attached growth process where the biofilm is attached to small plastic carriers suspended in the wastewater within the reactor tank by process air and/or mechanical mixing. The plastic carriers are retained in the tank by retaining screens while treated wastewater passes through to the (existing) secondary clarifiers.

The MBBR process offers several advantages over the TF/RBC: it provides full treatment within a single tank footprint; it is not susceptible to biomass washout during high flows; it is simple to operate and maintain; it matches well with the existing plant hydraulic gradient; and the treatment capacity can be easily expanded by adding more plastic carriers to the existing tankage. The design phase for the installation of the new MBBR process began in December 2016 and a construction contract is expected to be awarded this summer.

Daily plant flows have gradually increased over the past decade, and have averaged on an annual basis about 2.0 MGD in recent years. The plant has also experienced consecutive months with monthly average flows near 90% of the current permitted flow of 2.5 MGD. After discussions with staff and an evaluation of current performance it was deemed reasonable that the current capacity could increase to 3.0 MGD. The Town anticipates that an additional average daily flow of up to 0.50 MGD (20% increase), above the current permitted flow, may be needed in the foreseeable future based on the 2015 Utility Capacity Report, which projected community build-out to exceed the current 2.5 MGD plant capacity.

This report serves as a planning document for a capacity re-rating of the existing plant to 3.0 MGD average daily flow (ADF), taking into consideration maximizing the MBBR process and other improvements. The report includes an evaluation of the existing facilities and summarizes the recommended upgrades to the existing plant if the treatment capacity is to increase to 3.0 MGD.

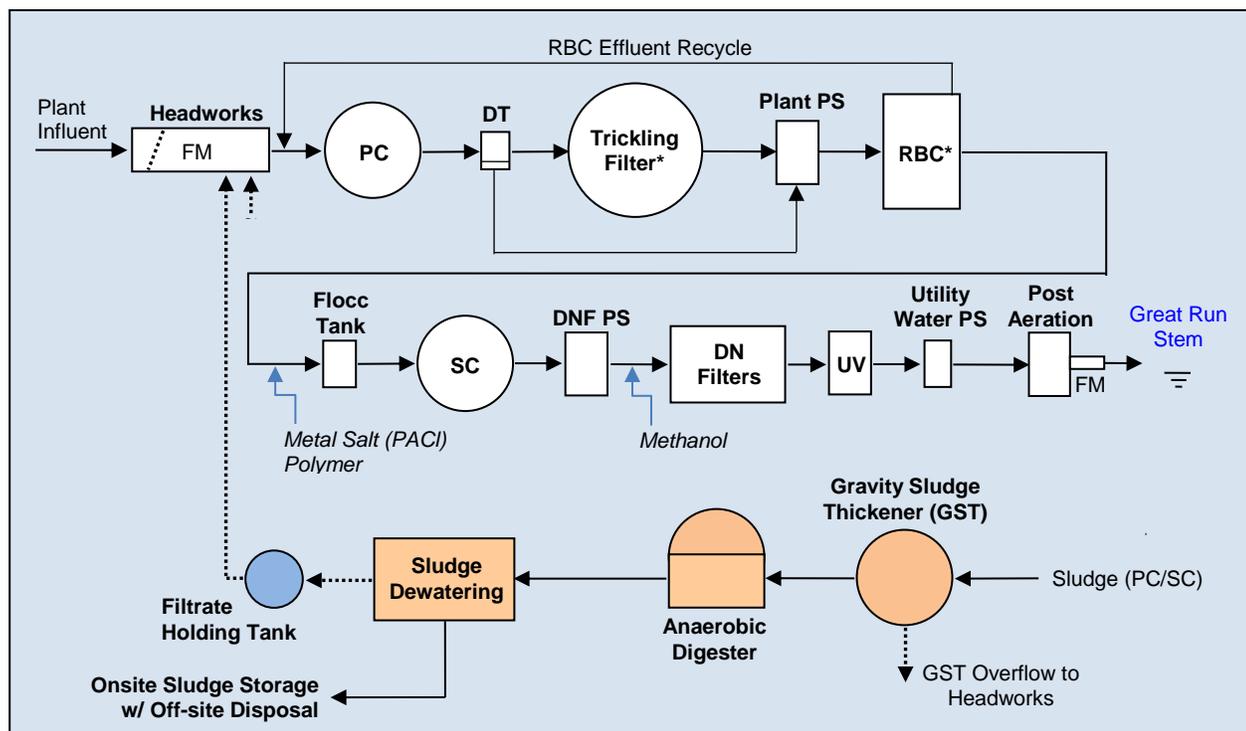


It should be noted that if the plant's permitted flow capacity is increased it is not expected that the current waste load allocations will, but rather fixed at the current levels. As such, plant (biological) treatment performance, or removal efficiency, will be more rigorous. While this is feasible up to the 3.0 MGD ADF, an expansion in capacity beyond this level would most likely require additional treatment technologies, with more operational complexity and disproportionate higher cost.

2 EXISTING TREATMENT FACILITIES

2.1 Existing Process Configuration

The current plant process flow is illustrated and described below.



Warrenton WWTP - Existing Process Flow Diagram (* to be replaced with the new MBBR process).

Raw wastewater from the Town's collection system enters the preliminary treatment works which include mechanical screening, aerated grit removal and influent flow metering (FM). Metered flow is conveyed via gravity to the primary clarifiers (PC). Primary effluent flows to a dosing tank (DT) and into a single stage trickling filter (TF) for BOD removal. Due to hydraulic constraints in the influent piping to the TF the dosing tank has an overflow weir that allows partial by-pass of primary effluent. The TF influent line has a manually operated valve for control of flow to the TF. Effluent from the TF and overflow from the dosing tank enter the intermediate plant pumping station where all flows are pumped to the Rotating Biological Contactors (RBCs). The RBCs include three parallel process trains, each with seven stages, and provide nitrification to comply with the plant's effluent ammonia limits. RBC effluent flows to the secondary clarifiers for suspended solids removal. A mixing/flocculation tank is provided upstream of the secondary clarifiers for addition of chemicals for phosphorus removal and improved solids removal. A portion of the RBC effluent is recycled to the primary clarifier influent to maintain adequate flow to the TF (media wetting). Secondary (nitrified) effluent is conveyed to the denitrification (DN) pumping station and pumped to the tertiary denitrification (DN) filters for total nitrogen removal



and for additional phosphorus and solids removal. Spent backwash water from the denitrification filters is discharged to the intermediate plant pumping station. Denitrified filter effluent flows through the UV-disinfection reactors, followed by mechanical post aeration and effluent flow metering (FM) before final discharge to Great Run, a tributary to Rappahannock River. Non-potable plant reuse water is drawn after UV-disinfection.

Sludge from the primary and secondary clarifiers is pumped to the gravity sludge thickener (GST). Thickener overflow is returned to the primary influent and thickened sludge is pumped to the primary anaerobic digester. Digested sludge is stored in the secondary digester before the sludge is dewatered with a belt filter press. Dewatered sludge is stored onsite and periodically hauled out for land application through contract operations. Filtrate, which is high in ammonia, is stored in an adjacent holding tank and returned (equalized) at a low constant rate to the primary influent.

The Moving Bed Bio-Reactor (MBBR) process, currently under design, will replace the existing trickling filter and RBCs. Primary clarifier effluent will be pumped to the MBBR process.

The following **Table 1** provides a summary of the existing plant unit processes. The existing site facilities are shown in **Appendix B**, including the proposed MBBR facilities.



Table 1: Summary of Existing Unit Processes

Process Unit	Qty.	Unit Sizing
LIQUID TREATMENT:		
Mechanically Cleaned Influent Screen	1	¼-inch screen; rated for 5.0 MGD peak flow By-pass channel w/ manual bar rack
Grit Removal	2	Aerated Grit Chambers, each 3.5' W x 25' L x 5.5' D (480 ft ³)
Influent Flow Meter	1	12-inch Parshall Flume; flow measuring capacity: 3' D (11.3 MGD)
Primary Clarifiers	2 2	No. 1 and 2: 26' diameter x 10.5 SWD (530 ft ² each) No. 3 and 4: 34' diameter x 10.5 SWD (900 ft ² each) – total (2,860 ft ²)
Trickling Filter*	1	125' diameter x 5' media depth Media: Plastic XF-60, 48 ft ² /ft ³ ; total media AS (2,943,750 ft ²)
Intermediate Plant Pumps	4	Each 1,800 gpm @ 55' TDH; 40 HP w/VFD
Rotating Biological Contactors* (RBC)	21	3 trains, each 7 RBCs RBC stages 1, 2 and 3: 100,000 ft ² per train RBC stages 4, 5 and 6: 150,000 ft ² per train RBC stage 7: 85,000 ft ² per train Total all stages: 835,000 ft ² per train; 2,505,000 ft ² all trains 5 HP RBC drives Aeration Blowers: 2 units, each 60 HP.
*New MBBR Replacement Process	2	2 trains, each train w/three (3) zones (BOD/Nitrification (2 zones)) Volume: 400,000 per train; 800,000 total (15 ft side-water depth) Media: 800 m ² /m ³ (40% media fill ratio) Aeration Blowers: 3 units, each 2,200 scfm, 125 HP
Flash Mixing	1	7.5 HP Mixer w/VFD Flash Mixing Tank Volume: 1,500 gallons
Flocculation Tanks	2	0.5 HP Flocculators w/VFD Flocculation Tank Volume: 17,900 gallons, each
Chemical Storage and Feed	2 2 1 2 1 2	Poly-aluminum Chloride Storage Tanks: 6,000 gallons each Poly-aluminum Chloride Feed Pumps: 25 gal/hr each Polymer Storage Tank: 900 gallons Polymer Feed Pumps: 20 gal/hr each Methanol Storage Tank: 11,800 gallons Methanol Feed Pumps: 25 gal/hr each
Secondary Clarifiers	1 1	No. 1: 64' diameter x 12' SWD (3,215 ft ²) No. 2: 50' diameter x 12' SWD (1,960 ft ²)
Denitrification Filter Pumps	4	2,200 gpm @ 29' TDH; 30 HP w/VFD
Denitrification Filters	4	Filter cells: 11.33' W x 26.83' L x 6' media depth; filter area each 304 ft ² (2) Backwash submersible pumps; 1,824 gpm @ 27' TDH; 25 HP each (2) Low pressure air scour blowers; 1,520 scfm @ 11 psig; 125 HP each
UV Disinfection	2	14" in-line UV reactors; medium pressure/high intensity; 5 MGD each
Plant Reuse Water Pumps	2	370 gpm @160' TDH; 20 HP
Post Aeration Tanks	2	Each Tank: 15' L x 15' W x 11' D (total volume 37,000 gallons)
Effluent Flow Metering	1	12-inch Parshall Flume; flow measuring capacity: 3' D (11.3 MGD)
SOLIDS HANDLING:		
Primary Sludge Pumps	2	50 gpm; 3 HP each
Secondary Sludge Pumps	2	240 gpm; 7.5 HP each
Gravity Thickener	1	28' diameter x 12' SWD (52,000 gallons); (615 ft ² surface area)
Anaerobic Digesters	2	Digester No. 1: 50' dia.; 20' SWD; 290,000 gallons (digestion) Digester No. 2: 40' dia., 20' SWD; 185,000 gallons (sludge holding)
Belt Filter Press	1	1-meter press 30,000 filtrate holding/equalization tank



2.2 Plant Influent Wastewater Loads

The plant does not routinely sample and analyze influent wastewater. However, in preparing the July 2016 Preliminary Engineering Report a two-week sampling program was conducted in March 2016 to characterize the influent and establish wastewater loads for preliminary design. Grab samples were collected just upstream of the influent flow meter (after screening and grit removal) three times a day, at the beginning of each shift, and then composited. The composite samples were analyzed for five-day biochemical oxygen demand (BOD₅), total suspended solids (TSS), total Kjeldahl nitrogen (TKN), ammonia and total phosphorus (TP). Influent alkalinity (CaCO₃) was also measured. In addition, side stream ammonia and TKN were measured from the belt filter press filtrate holding tank as the dewatering filtrate from anaerobically digested sludge typically has high ammonia concentration.

The sampling was targeted during a period with minimum precipitation to obtain dry weather baseline wastewater characteristics. Concentrations for BOD₅ ranged from 123 to 295 mg/L; TSS from 61 to 144 mg/L; TKN from 24 to 34 mg/L; and the average alkalinity was 145 mg/L (CaCO₃). These are all within the range of typical domestic wastewater. The average daily wastewater flows for the sampling period varied from 1.76 to 2.36 MGD. **Table 2** shows the representative primary influent wastewater concentrations based on the sampling data for plant influent and side stream flow from the filtrate holding tank. The TKN and ammonia recycle loads from the dewatering process account for about 15% and 25%, respectively, of the plant influent. The sampling results are included in **Appendix C**.

Table 2: Influent Wastewater Concentrations (mg/L)

	BOD ₅	TSS	TKN	NH ₃ -N	TP	Alkalinity
Plant Influent	200	100	30	20	4.0	145
BFP Filtrate*			333	294		
Primary Influent	200	100	35	25	5.0	145

*Average side stream flow at 20 gallons per minute (gpm).

Supplemental wastewater sampling was also conducted back in 2006 (during March) prior to the nutrient removal upgrade design. The recent 2016 sample data are similar to the wastewater characteristics obtained at that time. The 2006 data is also included in **Appendix C** for reference.

2.3 Plant Flows

Plant flows are recorded via the influent flow meter. **Figure 1** shows the historical daily average flows for 2013, 2014, 2015 and 2016, and the 30-day moving average flow. **Figure 2** shows the recorded daily maximum (peak hour) flow for the same period. For wastewater loads and treatment capacity evaluations the maximum month flow factor is used, while the peak (hour) flow factor is used for review of plant hydraulics. **Table 3** shows the annual average flow for the last three years, the corresponding maximum month (30-day) flow and maximum month to average month factor. The total annual rainfall (inches) is also listed, showing higher plant flows during relatively wet years (2013 and 2014).

Table 3: Historical Plant Flows (MGD) and Rainfall

	Annual Average Flow	Maximum Month Flow	MM/AA Factor	Annual Total Rainfall
2013	2.03	2.42	1.18	51.9"
2014	2.01	2.60	1.30	47.6"
2015	1.86	2.20	1.18	42.4"
2016	1.73	2.18	1.26	37.3"
Average	1.91		1.2	



The plant annual average flow for the period 2013-2016 was about 1.9 MGD. The maximum month peak factor to be used in the evaluations is 1.2 (20% above annual average flow). The maximum (peak) day flows recorded for the period is about 6 MGD corresponding to a peak flow factor of 3.0. These flow factors are similar to the factors used in the 2005 Preliminary Engineering Report prepared (by WRA) prior to the Nutrient Removal Upgrade design.

It is noted that the influent flow chart maxes out at 6 MGD and flows above this rate are not recorded. **Figure 2** shows that peak flows capped at 6 MGD occurred 10-12 times during the 2013-2016 period, typically associated with high rainfall intensity. The plant has handled these peak flows without overflow incidents. It is suspected that some flow attenuation/temporary backup may occur in the trickling filter, but due to the TF being covered this is difficult to verify. It is also noted during extreme wet weather events the upstream collection system Cedar Run Pump Station surcharges into the holding lagoon for temporary storage. The lagoon is drained back to the pump station and pumped to the WWTP during lower flows. Despite higher observed peak flows, a peak factor of 3.0 is used in this evaluation. However, wet weather flow management will need to be addressed in a plant re-rating scenario. It is noted that Town has made continuous efforts with I/I studies and evaluations on its collection system to identify deficiencies and address sub-areas subject to high inflow.

2.4 Plant Effluent Performance

Under the current effluent discharge permit (**Appendix A**) the plant is required to comply with monthly and weekly limits for concentration and wastewater loads for BOD₅ and TSS, and to comply with monthly and weekly concentration limits for ammonia-nitrogen. For nutrients, the permit requires a calendar year average effluent concentration of 4.0 mg/L, or less for total nitrogen (TN) and 0.3 mg/L or less for total phosphorus. There is a corresponding annual load allocation for TN (30,456 lbs) and TP (2,284 lbs) based on the permitted average daily flow of 2.5 MGD. **Table 4** shows the discharge permit limits.

Table 4: Current Plant Discharge Permit Limits (at 2.5 MGD ADF)

Parameter	Monthly Average	Weekly Average
Flow = 2.5 MGD		
BOD ₅	10 mg/L (95 kg/d)	15 mg/L (140 kg/d)
TSS	10 mg/L (95 kg/d)	15 mg/L (140 kg/d)
Ammonia-N	1.4 mg/L	1.7 mg/L
	Calendar Year Average	Annual Load Allocation
Total Nitrogen	4.0 mg/L	30,456 lbs
Total Phosphorus	0.3 mg/L	2,284 lbs

The graphs on **Figures 3A, 3B, 4A and 4B** show the historical monthly and weekly effluent concentrations for BOD₅ and TSS for 2013-2016 which are well below the permit limits. For ammonia-nitrogen (**Figures 5A and 5B**), the monthly and weekly effluent concentrations are averaging less than 0.5 mg/L, with the exception of a period between October 2013 and March 2014 during which the trickling filter was offline for repairs for an extended time. During this time full BOD₅ removal was shifted to the RBC process resulting in reduced nitrification capacity and higher effluent ammonia levels. This resulted in effluent ammonia concentrations for November 2013 and January 2014 that exceeded the monthly and weekly limits. Once the trickling filter was brought online, the nitrification capacity was restored and effluent ammonia concentrations improved.

Table 5 shows the calendar year average effluent concentrations for total nitrogen and total phosphorus for 2013-2016, well below the permit requirements for nutrient discharge. **Figures 6 and 7** shows the monthly concentrations. **Table 5** also shows the nitrogen fractions (ammonia, nitrate and organic-N).



Table 5: Annual Average Plant Effluent for Nitrogen and Total Phosphorus (mg/L)

	Annual Average Flow	Total Nitrogen (TN)	Total Kjeldahl Nitrogen (TKN)	Nitrate Nitrogen (NO ₃)	Ammonia Nitrogen (NH ₃)	Organic Nitrogen (Org-N)	Total Phosphorus (TP)
2013	2.03 MGD	3.5	1.4	2.1	0.47	0.93	0.15
2014	2.01 MGD	3.4	1.3	2.1	0.49	0.81	0.21
2015	1.86 MGD	3.3	1.5	1.8	0.22	1.28	0.20
2016	1.73 MGD	3.1	1.3	1.8	0.16	1.14	0.26

3 PLANT CAPACITY EVALUATION

3.1 Basis for Evaluation

This section discusses a re-rating of the existing plant capacity for an average design flow of 3.0 MGD and the improvements needed to the treatment processes. The review considers the average day and maximum month wastewater loadings for the liquid treatment and solids handling process, and peak flows where applicable, such as clarifier overflow rates, intermediate plant pumping and overall plant hydraulics. From the previous review of historical plant flows the design maximum month (MM) flow is assumed 20% higher than the average month. The design peak (hour) hydraulic flow is based on the observed peak-to-average ratio of 3.0. **Table 6** shows the design flows and wastewater characteristics used for the plant re-rating evaluation. The wastewater concentrations are based on the recent influent sampling data.

Table 6: Flows and Influent Wastewater Concentrations for Plant Capacity Eval.

ADF (MGD)	MM (MGD)	Peak (MGD)	Primary Influent (mg/L)					
			BOD ₅	TSS	TKN	NH ₃ -N	TP	Alkalinity
3.00	3.60	9.00	200	100	35	25	5.0	145

3.2 Effluent Requirements for Plant Re-rating

The capacity review considers the effluent limits in the plant’s current discharge permit and assumes that the current permitted waste load allocations will need to be maintained (this may be subject to review and discussion with VADEQ permit compliance group). As such, more stringent effluent concentrations for the permit parameters would be required at an ADF re-rating scenario to 3.0 MGD. **Table 7** shows the anticipated effluent concentrations for BOD₅, TSS, nitrogen and phosphorus under a re-rating scenario.



Table 7: Effluent Limits at Current Capacity, and Requirements at 3.0 MGD ADF

Parameter	Monthly Average*		Weekly Average*	
	Average Design Flow	2.5 MGD	3.0 MGD	2.5 MGD
BOD ₅	10 mg/L	8.3 mg/L	15 mg/L	12.5 mg/L
TSS	10 mg/L	8.3 mg/L	15 mg/L	12.5 mg/L
Ammonia-N	1.4 mg/L**		1.7 mg/L**	
	Calendar Year Average		Annual Load Allocation	
Average Design Flow	2.5 MGD	3.0 MGD		
Total Nitrogen	4.0 mg/L	3.33 mg/L	30,456 lbs	
Total Phosphorus	0.3 mg/L	0.25 mg/L	2,284 lbs	
* The effluent concentration limits are based on fixed waste load allocations ** Assume effluent concentration limits remain (no waste load allocation for ammonia)				

For BOD₅ and TSS the plant has historically performed well. Meeting more stringent monthly and weekly effluent concentrations as shown in Table 7 for 3.0 MGD ADF scenario is attainable with the new MBBR process (as well as the current secondary and tertiary processes), provided that the treatment capacity (in terms of flow) is adequate.

Since the permit has an ammonia concentration limit but no associated mass loading, the current monthly and weekly average ammonia limits (1.4 mg/L and 1.7 mg/L) are expected to remain even if the permitted design flow is increased, unless specific ammonia driven effluent toxicity issues should arise.

Under the Chesapeake Bay Restoration program Warrenton WWTP has been required to remove nutrients since the 2007 nutrient removal upgrade. Plant discharge cannot exceed the total annual mass load for total nitrogen (30,456 lbs) and total phosphorus (2,284 lbs), as shown in **Table 7**. In a re-rating scenario, it is unlikely that a corresponding increase in the annual mass loading would be allowed and the plant will need to perform at proportionally lower effluent concentrations. While the plant's current nutrient removal technology can produce a high quality effluent, as plant records demonstrate, a flow increase will gradually require tighter operational performance. But, since there is no permit specific monthly or weekly *concentration* limits for TN and TP the plant does have some flexibility over the course of the calendar year to reliably meet the total annual based mass loading. Likewise, maximizing the planned MBBR process combined with the existing denitrification filters can also achieve the more stringent operation performance. However, an increase in the average design flow beyond 3.0 MGD would become much more challenging with regard to nutrient removal and could require additional and costly technology upgrades.

Table 7 shows that the annual TN concentration equivalent is 3.33 mg/L at 3.0 MGD ADF. Total nitrogen is the sum of TKN (ammonia + organic nitrogen) and nitrate/nitrite. To meet the effluent TN requirement, each of these parameters (ammonia, organic-N and nitrate) need to be targeted at 1 mg/L or less based on Best Available Technology (BAT). **Table 5** shows the annual average nitrogen effluent concentrations for 2013, 2014, 2015 and 2016. Ammonia is at 0.5 mg/L or less, remaining organic nitrogen is about 1.0 mg/L, which is considered mostly non-biodegradable (refractory), and the nitrate is about 2 mg/L. The MBBR process can be designed to achieve these low ammonia/organic nitrogen levels. The effluent nitrate concentration will need to be trimmed. Per discussions with plant operations, the nitrate levels are controlled based on economical methanol dosing while still targeting an overall effluent TN level below 4 mg/L. Nitrate can be further reduced through a slight increase in methanol dose (without impacting effluent BOD).

The following section reviews each process unit and the anticipated upgrades required at an Average Design Flow of 3.0 MGD.



4 LIQUID TREATMENT FACILITIES

4.1 Preliminary Treatment (Headworks)

4.1.1 Influent Screening

A new mechanical screen (1/4") system was recently installed in the existing influent channel and is rated for a peak flow of 5 MGD. At higher flow conditions the existing by-pass channel and manually cleaned bar rack may handle excess flows from the main channel. No improvements are anticipated.

4.1.2 Grit Removal

The existing aerated grit chambers satisfy the Virginia Sewage Collection and Treatment (SCAT) requirements for minimum detention time (3 min) at average flow (both chambers in service) for 3 MGD ADF. No improvements are anticipated.

4.1.3 Influent Flow Metering

The existing 12-inch Parshall flume has adequate flow measuring capacity for average and peak flows.

4.2 Primary Clarifiers

The existing four (4) primary clarifiers include two (2) 26-ft diameter units and two (2) 34-diameter units, with a total surface area of 2,870 ft². The SCAT regulations indicate that the surface overflow rate (SOR) should not exceed 1,000 gpd/ft² at average design flow and 2,500 gpd/ft² for peak flow, and the hydraulic retention time (HRT) should be minimum 2 hours at average design flow. At 3.0 MGD average design flow scenarios, the SOR is 1,040 gpd/ft², all units online, with an HRT of about 1.8 hours which is consistent with the SCAT recommendations. At peak design flows (9 MGD) the SOR is 3,100 gpd/ft², which is about 20% higher than the SCAT recommendations. Other conventional design standards recommend between 2,000 and 3,000 gpd/ft² for peak SOR.

Rather than providing additional primary clarifier capacity, it is recommended that by-pass of excess peak flows around the primary clarifier be considered to bring the surface overflow rates for the clarifiers within the range of the SCAT recommendations and conventional design. The excess flow by-pass could be provided via an overflow weir in the existing primary flow split box. At the peak design flow rate of 9.0 MGD about 2 MGD would need to be by-passed.

4.3 Secondary Biological Process – *proposed Moving Bed Bio-Reactor (MBBR) Process*

Based on the recommendations in the July 2016 Preliminary Engineering Report, the new MBBR process is currently being designed to replace the treatment function of the trickling filter and RBCs, providing for both BOD removal and nitrification at the current plant capacity of 2.5 MGD. The MBBR system can be sized to facilitate a future increase in treatment capacity. The higher capacity can be achieved by expanding the (concrete) tank volume to accommodate an increase in the amount of total carrier media.

4.4 Intermediate Plant (RBC) Pumping Station

The intermediate pumping station pumps trickling filter effluent to the RBC process via a 16-inch force main. With the new MBBR process the force main line will be extended to the MBBR influent chamber (new 20-inch line extension). The submersible pumps were recently upgraded to larger units. With the new MBBR process the peak pumping



capacity is estimated at about 8 MGD with three of the four pumps operating, and about 10 MGD with all units in service. As such, additional pumping capacity should not be needed.

4.5 Secondary Clarifier Mixing/Flocculation Tanks

Poly-aluminum chloride (PACl) and anionic polymer are fed prior to the secondary clarifiers for chemical phosphorus removal and improved TSS removal. The chemical feed systems and mixing/flocculation tanks are adequate. There will be a slight reduction in the number of days of chemical storage as the chemical feed rate would increase with increased flows.

4.6 Secondary Clarifiers

The two existing secondary clarifiers include one 64 feet diameter unit and one 50 feet diameter unit, each with 12-ft sidewater depth, and with a total surface area of 5,180 ft². The clarifier depth is within the recommended range. The SCAT regulations indicate that the surface overflow rate (SOR) should not exceed 500 gpd/ft² and 1,200 gpd/ft² at average and peak flows, respectively, for clarifiers following an attached growth biological process. Also, the SCAT regulations indicate that for conventional clarifiers used with chemical clarification, the design SOR shall not exceed 600 gpd/ft². At 3.0 MGD average design flow, the SOR is 580 gpd/ft², all units online, which is consistent with the SCAT recommendations. At peak design flows (9 MGD) the SOR is 1,740 gpd/ft². The estimated solids loading rates (SLR) based on MBBR effluent are well below the SCAT criteria for attached growth processes (SCAT criteria: 0.6-1.0 lbs/ft²/hr at average design; 1.6 lbs/ft²/hr at peak loading).

At design peak flows the surface overflow rates exceed the SCAT criteria for the existing clarifiers. Rather than adding new clarifiers it is recommended that the existing trickling filter be retrofitted for excess flow storage during peak wet weather conditions, since the trickling filter will no longer be required for treatment with the new MBBR process. The trickling filter has an estimated usable storage volume of about 350,000 gallons (the trickling filter media would be removed). This volume would be more than adequate to reduce the peak flow rate through the plant to minimize the hydraulic impact on the secondary clarifiers and other process units. Alternatively, the RBC tankage could also be used for peak flow storage (remove the RBC units) where a portion of the flow from the Plant Pump Station can be diverted for temporary storage prior to the MBBR. The storage volume available in the RBC tanks is about 250,000 gallons.

It should be noted that it is not recommended to partially by-pass the secondary clarifiers during peak flow events as this could result in excessive solids loading on the denitrification filters.

4.7 Denitrification Filter (DNF) Pumping Station

The DNF pumping station was constructed as part of the 2007 Nutrient Removal Upgrade. It pumps secondary nitrified effluent to the tertiary denitrification filters. The pumping station is designed for a peak flow of 9.6 MGD (with three pumps online and one pump off line). The station has (emergency) overflow provision to allow flows to by-pass the DNF facility and be conveyed via gravity to UV-disinfection. No upgrades to the pumping station will be required.

4.8 Tertiary Denitrification Filters

Nitrates in the effluent from the RBC (nitrification) process are denitrified in the tertiary denitrification filters, installed in the 2007 Nutrient Removal Upgrade, to provide total nitrogen removal and effluent phosphorus polishing. External carbon (methanol) is added to the process. The facility includes four deep-bed (4) filters, each 11.5ft W x 26ft L with 6 feet media depth. Each filter area is nominally 300 ft², or 1,200 ft² total with all filters online.



At 3.0 MGD ADF the hydraulic filter loading and volumetric nitrate loading would be about 1.8 gpm/ft² and up to 55 lbs-nitrate/1,000 ft³/day, which are within conventional deep bed DN filter design criteria. During maximum month conditions where the filter loading is higher, the denitrification performance (and TN removal) may be slightly lower. However, there is no monthly permit limit and it would not affect the ability to meet the annual nitrogen mass load limit. The filter peak hydraulic loading (at 9 MGD) would be about 5 gpm/ft² which is also acceptable. Thus, the filter capacity is adequate and no additional filters or other upgrades are required for 3.0 MGD ADF. The methanol facility has adequate storage and feed capacity.

4.9 Effluent Disinfection

Prior to the 2007 Nutrient Removal Upgrade the gas chlorination/dechlorination facilities were replaced with an ultra-violet (UV) disinfection system. The system includes two parallel 14-inch in-line UV Reactors located in a below-grade vault. Each reactor is rated for 5 MGD. There is provision to add a future third unit which will require a new below-grade vault and connection to existing piping.

At current conditions, one UV Reactor is operating at average flows and the second reactor is turned on at higher flows. The SCAT regulations require that if no more than two UV banks are provided, each UV bank shall be capable of disinfecting the maximum daily flow (not peak flow). Based on plant records for 2013 - 2016, the ratio of maximum daily-to-average flow is about 1.6. Thus, at 3.0 MGD ADF, the maximum daily flow is projected at 4.8 MGD, less than 5 MGD. Therefore, unless otherwise required by VADEQ, the need for an additional UV unit is not anticipated at 3.0 MGD ADF.

The current two-reactor configuration has a hydraulic capacity greater than 10 MGD (with both reactors online). An increase in the hydraulic gradient, due to additional head-loss across the UV reactors at higher flows, is adequately contained within the DN filter effluent clear-well.

4.10 Post Aeration

The existing post aeration tanks are provided with mechanical surface aerators to meet the permit requirements for dissolved oxygen in the final effluent. The existing tank volume provides adequate detention times at average and peak flows based on conventional design (there are no specific SCAT criteria).

4.11 Effluent Flow Metering

The existing 12-inch Parshall flume can adequately measure the maximum flows.

5 SOLIDS HANDLING FACILITIES

For 2013 – 2016, plant operating records show the average sludge flow (primary and secondary) from the gravity thickener to Digester No. 1 is about 15,000 gallons per day. The average solids concentration is around 2.6%, thus approximately 3,250 lbs/day total sludge is generated based on an average daily plant flow of 2.0 MGD for the same period. As plant flows increase it is assumed there will be a proportional increase in sludge generation. **Table 8** shows planning level estimates for sludge quantities at current and higher average plant flows. Maximum month sludge quantities are assumed 20% higher than average.



Table 8: Total Estimated Sludge Quantities (lbs/day)

	Current (2.0 MGD)	Permit ADF (2.5 MGD)	3.00 MGD
Average Month	3,250	4,060	4,875
Maximum Month	3,900	4,870	5,850

5.1 Sludge Pumping

The existing pumping equipment for primary and secondary sludge is adequate. The pump operating times may increase slightly at higher plant flows or solids loadings.

5.2 Gravity Thickening

Primary and secondary sludge is co-thickened in the existing 28 ft diameter gravity sludge thickener which has a side water depth of 12 ft. Conventional gravity thickener surface overflow rates and solids loading rates for combined primary and secondary sludge range from 150 – 300 gpd/ft² and 5 – 10 lbs/ft²/day, respectively. With an estimated primary/secondary sludge feed rate of about 80,000 gallons per day (based on 0.5% solids concentration and current average sludge quantity) and 15,000 gallons per day sludge underflow (to Digester No. 1), the current average thickener overflow is 65,000 gpd, with a resulting surface overflow rate of about 105 gpd/ft². The solids loading rate is about 5.3 lbs/ft²/day based on **Table 8**. At the 3.0 MGD ADF scenario, the overflow rate is estimated at about 160 gpd/ft² and the solids loading rate is about 8 lbs/ft²/day. These rates are within the range of conventional design standards for gravity co-thickening. Therefore, improvements to the gravity sludge thickener are not anticipated.

5.3 Anaerobic Digestion

Thickened sludge is digested and stabilized in existing Anaerobic Digester No.1. Digester No. 2 is used for digested sludge holding, with no mixing or heating provided, prior to sludge dewatering (two-stage digestion). The solids concentration in Digester No. 1 is typically 1-2.5%. The digesters require adequate capacity (volume, heating and mixing) to meet the sludge stabilization requirements (per EPA Part 503), i.e. solids retention time (SRT) of 15 days and volatile solids reduction of 38% or greater. At the projected sludge quantities and with typical volatile solids loading rates, it is anticipated that Digester No. 2 at some point will need to be in service to meet the sludge stabilization requirements. Therefore, upgrades including mixing, heating and other necessary retrofit, will be required for Digester No. 2.

A few years ago, Digester No. 1 was taken offline for cleaning and inspection. Removal of inert solids and other debris, built up over many years, will improve the capacity of Digester No. 1. This may allow sufficient interim capacity, and could defer additional upgrades to Digester No. 2 until flows are near 3.0 MGD ADF.

5.4 Sludge Dewatering and Storage

The old belt filter press (BFP) was recently replaced with a new 1-meter belt press for dewatering digested sludge. Dewatering operation is on week-days during normal shift hours, 50 – 60 hours/week, processing about 15 – 20,000 gallons per day with a sludge feed rate of 40 – 50 gpm. Based on the projected sludge quantities at 3.0 MGD ADF an increase in BFP operating time is expected, however, no additional dewatering capacity is anticipated. The dewatering filtrate, which is high in ammonia, is stored and equalized in a 30,000 gallon tank and returned to the primary influent at a controlled rate to equalize the nitrogen recycle load to the plant. The existing holding/equalization tank is adequate.



Dewatered sludge/biosolids is stored on-site and periodically hauled out for off-site land application through contract operations. If extended wet seasons occur and haulers cannot land apply the biosolids, the on-site storage capacity becomes limited. As such, it is anticipated that additional dewatered sludge storage capacity will be needed.

6 PLANT HYDRAULICS

The existing plant was designed with a maximum hydraulic capacity of 5 MGD (based on the 1990 upgrade), although the plant has historically experienced higher flows. In 2013 and 2014 peak flows frequently exceeded 5 MGD associated with significant wet weather events. As part of the UV-Disinfection and Nutrient Removal upgrades in 2007 some of the previous hydraulic restrictions in the plant were eliminated, however, the existing hydraulic conveyance capacity between certain process units may still be limited at the peak flows associated with 3.0 MGD ADF. As mentioned in section 4.2, a partial by-pass around the primary clarifiers during the highest peak flow conditions and using the existing trickling filter as excess flow storage should alleviate most of the downstream potential plant hydraulic restraints. The trickling filter would be modified to serve as temporary flow storage (removing the media and rotary piping).

7 COST EVALUATION

Table 9 summarizes the foregoing existing plant capacity review and the upgrades considered for a plant re-rating to 3.0 MGD Average Daily Flow (ADF).

Table 9: Summary of Plant Capacity Review

Process Unit	Capacity at 3.0 MGD ADF	Improvements Needed
Influent Screen / Grit Removal / Flow Metering	OK	None
Primary Clarifiers	OK for ADF; stressed at peak flow conditions	Provide excess peak flow by-pass / storage / flow equalization in ex. trickling filter
TF/RBC	Replaced by planned new MBBR Process	Retrofit the trickling filter (or RBCs) for excess peak flow storage/equalization
Proposed MBBR Process (2 parallel process trains)	OK for 3.0 MGD with both trains online, but needs additional redundancy	Expand tankage and increase amount of biofilm carrier media to ensure reliable treatment capacity
Intermediate Plant PS	OK	None
Secondary Clarifiers	OK for ADF; stressed at peak flow conditions	Provide peak flow by-pass upstream via the existing trickling filter (see above)
DNF Pump Station	OK	None
DN Filters	OK	None
UV-Disinfection	OK	None
Post Aeration / Effluent Flow Metering	OK	None
Plant Hydraulics	Potential hydraulic constraints at peak conditions	Provide peak flow by-pass upstream via the existing trickling filter (see above)
Gravity Sludge Thickening	OK	None
Anaerobic Digestion	OK near term	Anticipated upgrades to Digester #2
Sludge Dewatering	OK	Increase operating hours of Belt Filter Press
Dewatered Sludge Storage	Deficient storage during limited field application periods	Expand storage capacity



Planning level cost estimates (2017 dollars) for a plant expansion to 3.0 MGD Average Daily Flow (ADF) is listed in **Table 10**. Costs are shown based on anticipated fiscal year expenditures for facility improvements.

Table 10: Estimated Planning Level Costs of Plant Expansion to 3.0 MGD ADF

Item	Planning Level Cost	FY
Liquid Treatment		
Additional MBBR Tank Volume and Media	\$450,000	17, 18, 19
Plant Hydraulics		
Retrofit ex. Trickling Filter for Peak Flow Storage	\$100,000	22
Yardpiping Improvements	\$150,000	22
Solids Handling		
Upgrades to ex. Digester No. 2	\$500,000	20
Sludge Storage Expansion	\$80,000	23
Sub-Total		
Contingency (25%)		
Engineering and Administration (15%)		
Total		



Figures

FIGURE 1

Daily Plant Influent Flows 2013 - 2016

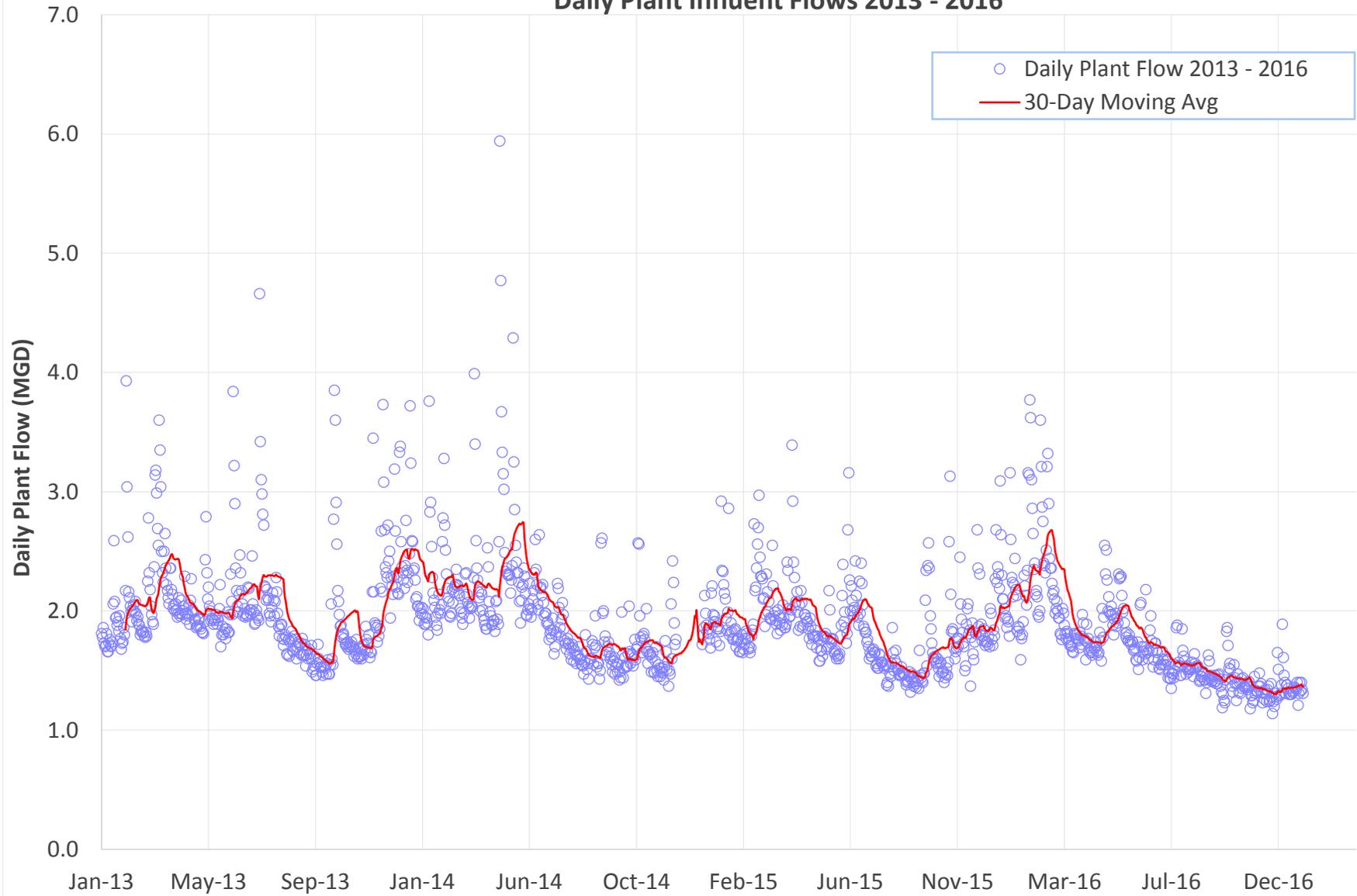


FIGURE 2
Peak Daily Plant Flows 2013 - 2016

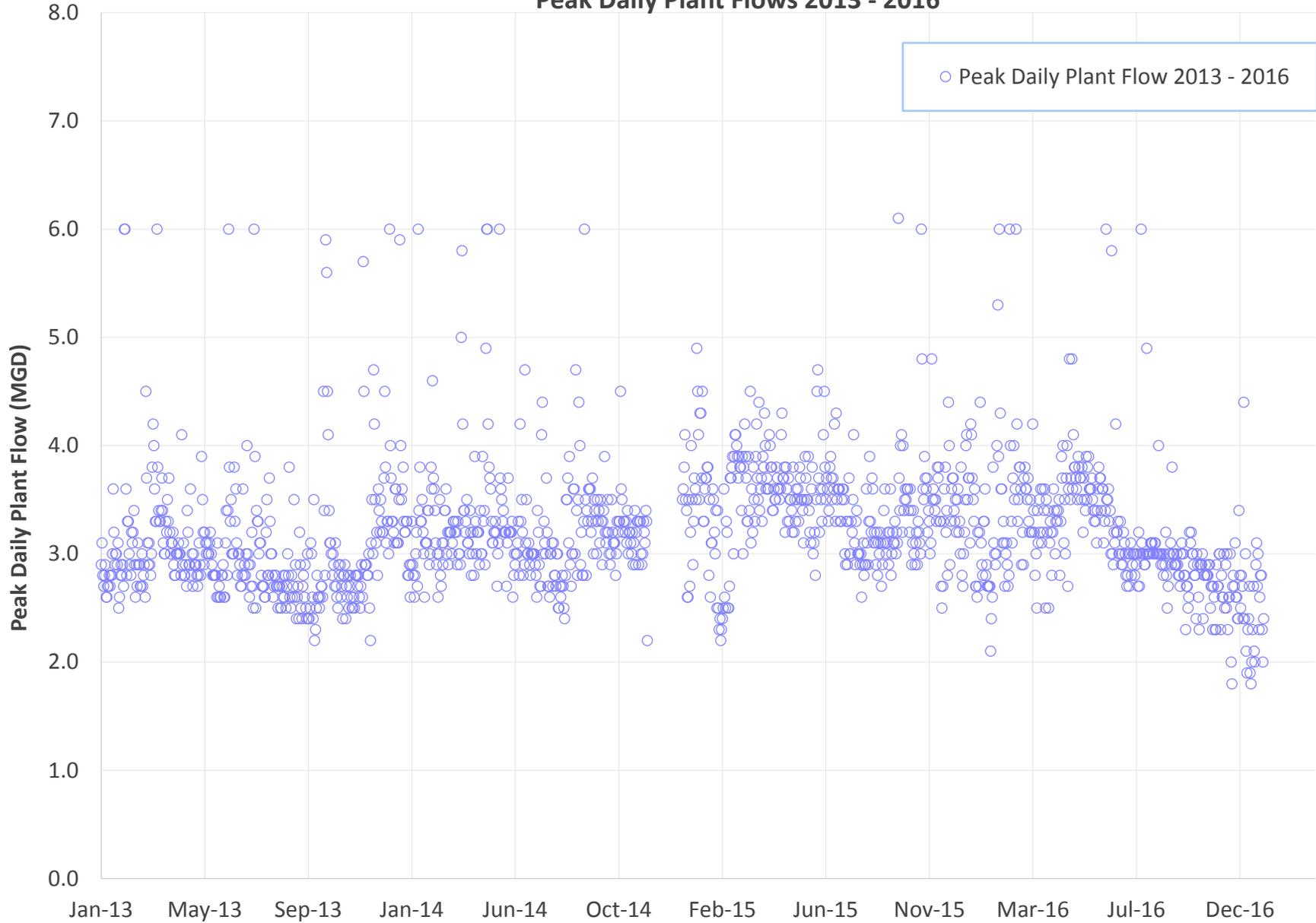


FIGURE 3A
Effluent BOD₅ Monthly Conc. 2013 - 2016

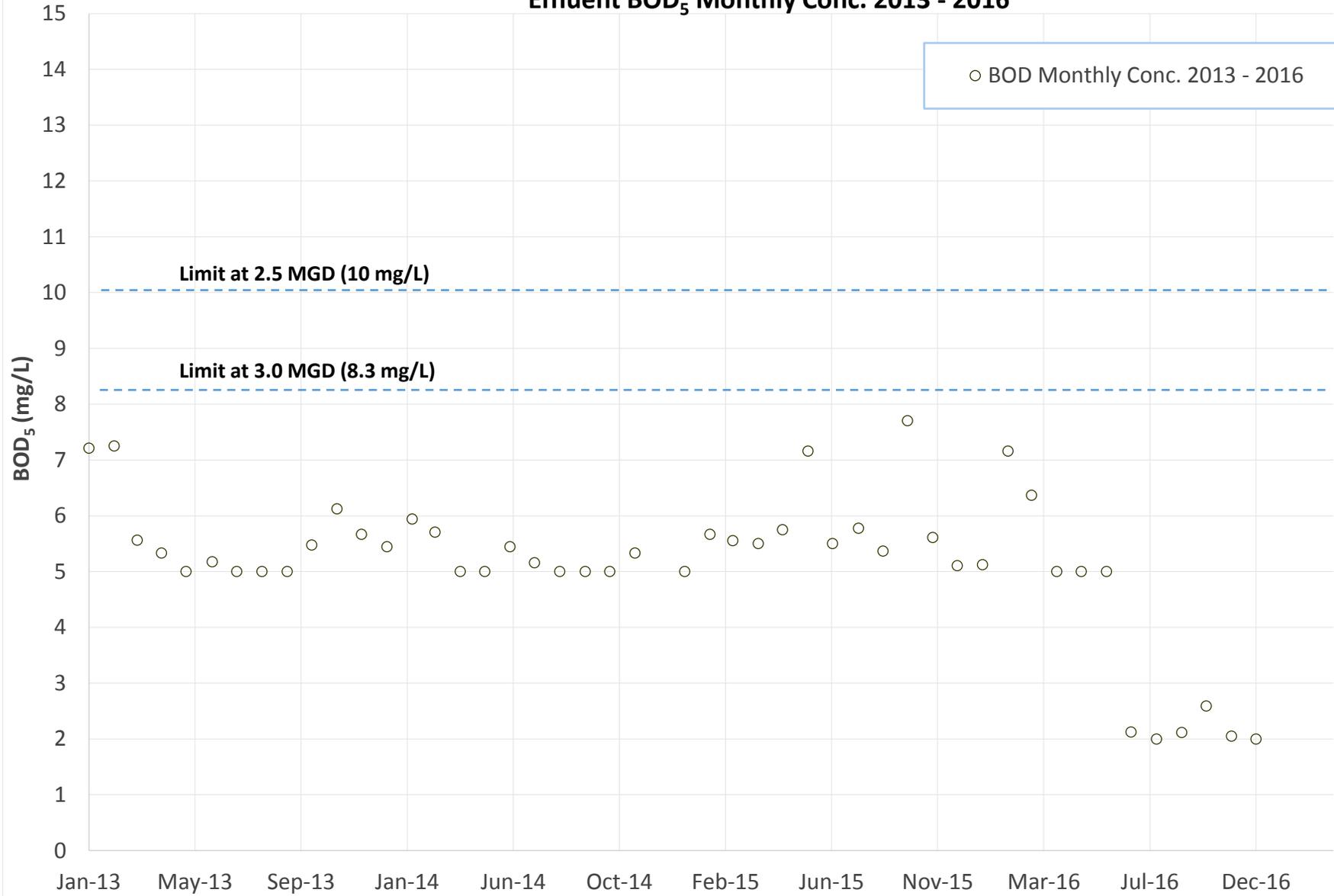


FIGURE 4A
Effluent TSS Monthly Conc. 2013 - 2016

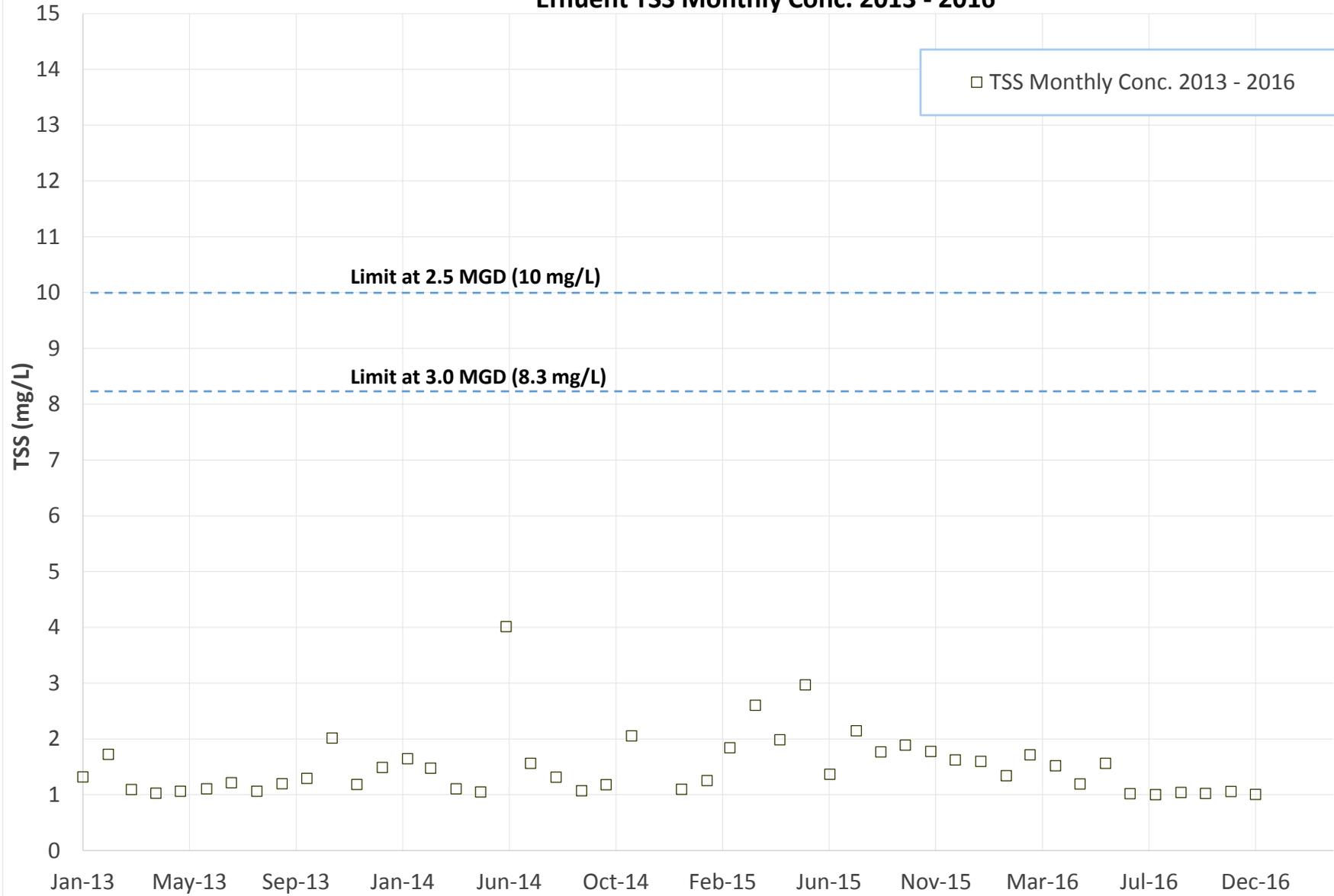


FIGURE 5A
Effluent Ammonia-N Monthly Conc. 2013 - 2016

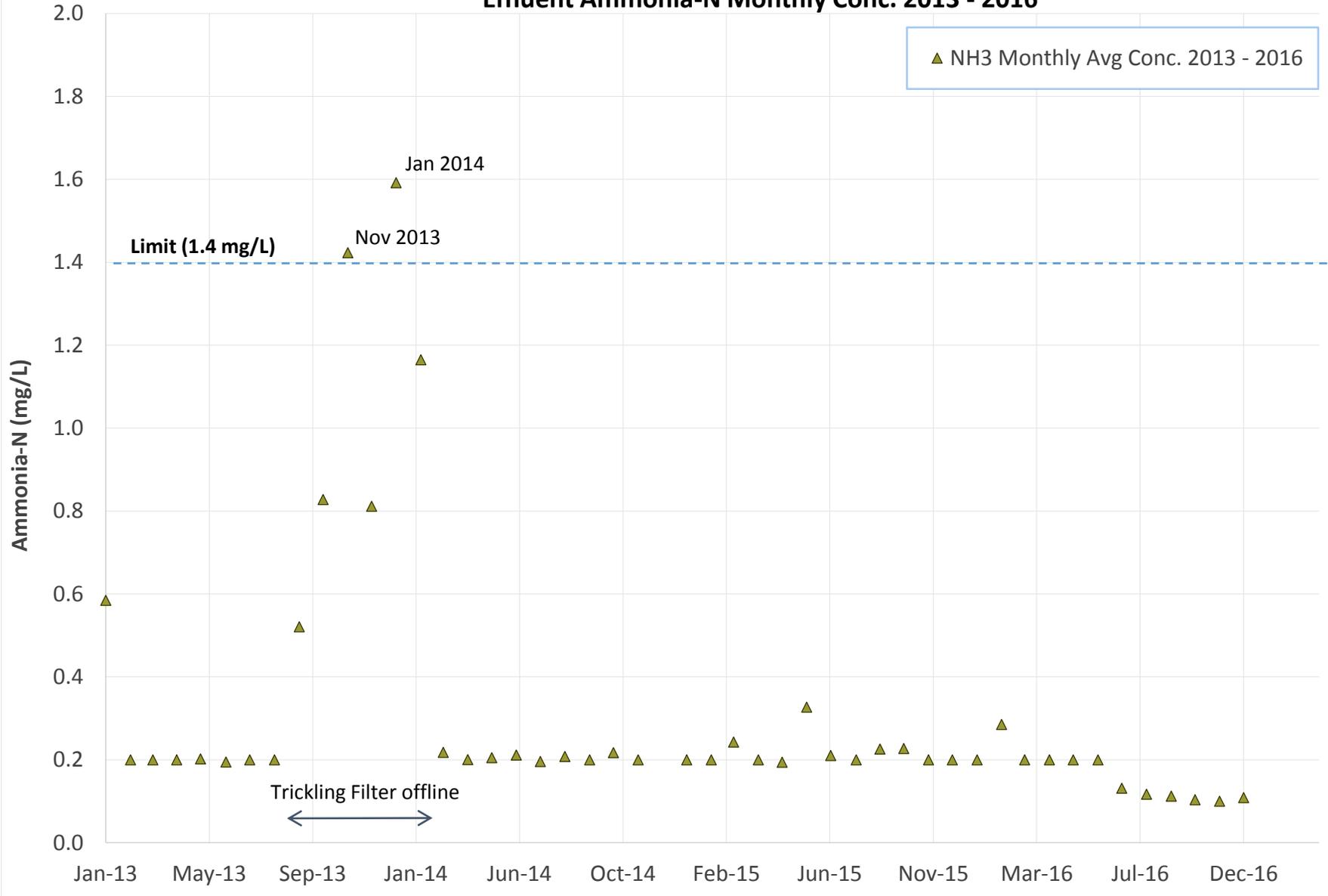


FIGURE 6
Effluent TN Monthly Conc. 2013 - 2016

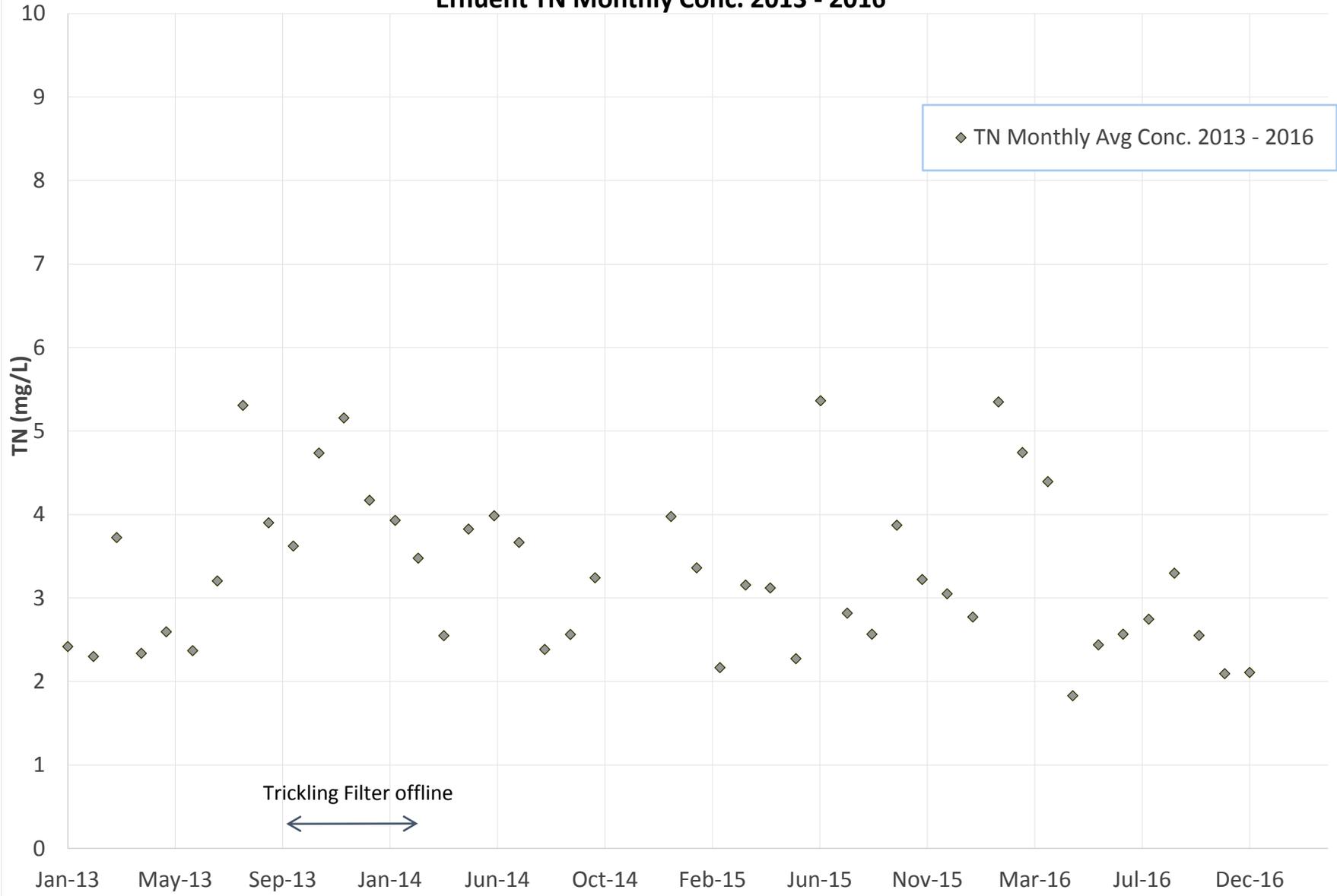


FIGURE 7
Effluent TP Monthly Avg Conc. 2013 - 2016

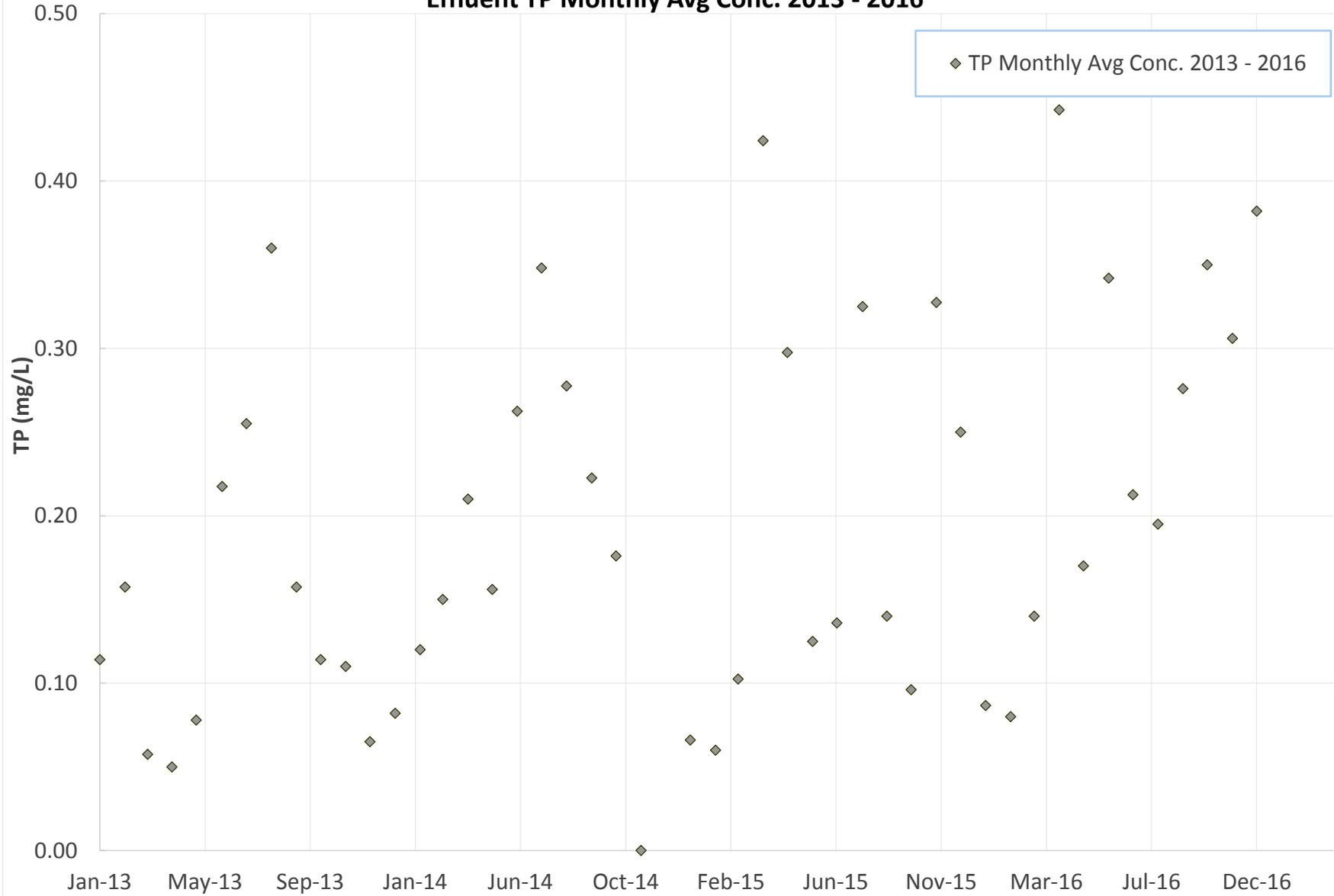
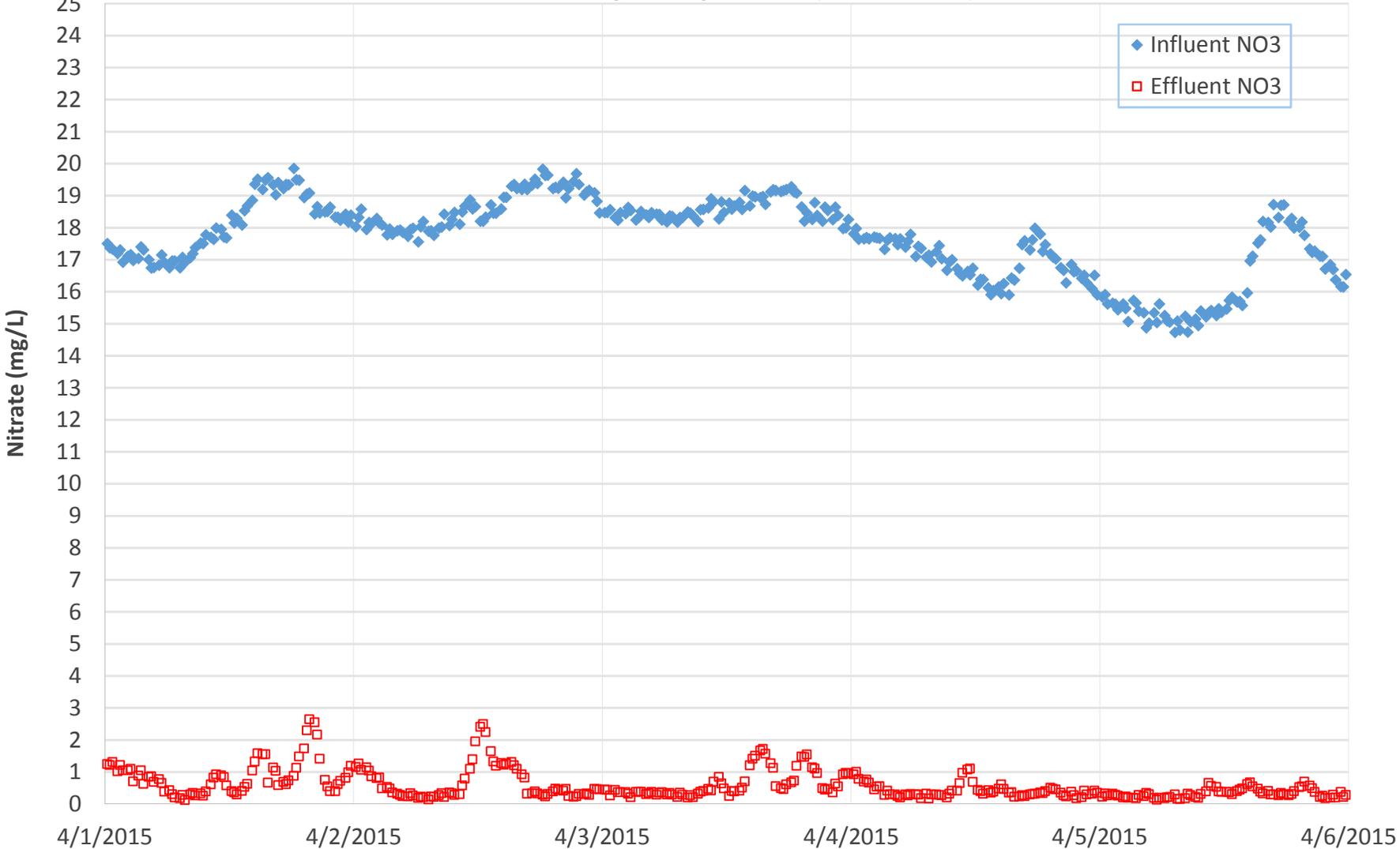


FIGURE 8
DN Filter Influent & Effluent Nitrate (mg/L)
Nutrient Analyzer - April 2015 (15 min data)



Appendices

Appendix A

Plant NPDES Discharge Permit





COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHERN REGIONAL OFFICE

13901 Crown Court, Woodbridge, Virginia 22193

(703) 583-3800

www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

Thomas A. Faha
Regional Director

11 July 2016

CERTIFY RECEIPT REQUESTED

Via email at etucker@warrentonva.gov

Edward B. Tucker, Jr.
Director of Public Works and Utilities
Town of Warrenton
Post Office Drawer 341
Warrenton, VA 20188-0341

Re: Reissuance of VPDES Permit No. VA0021172
Town of Warrenton Wastewater Treatment Plant
Fauquier County

Dear Mr. Tucker:

The Department of Environmental Quality (DEQ) has approved the enclosed effluent limitations and monitoring requirements for the aforementioned permit. Copies of your permit and fact sheet are enclosed.

Discharge Monitoring Report (DMR) forms, excluding sludge DMRs, are no longer included in the reissuance package since you are enrolled in DEQ's electronic DMR (eDMR) program. The first electronic DMR submittal for the month of August is due by 10 September 2016. Please reference the effluent limits in your permit and report monitoring results in eDMR to the same number of significant digits as are included in the permit limits for the parameter.

The regional contact for eDMR is Rebecca Vice; she can be reached at 703-583-3922 or by email at Rebecca.Vice@deq.virginia.gov.

Please note that compliance with the permit's requirements for use and disposal of sewage sludge does not relieve you of your responsibility to comply with federal requirements set forth in 40 CFR Part 503. Until DEQ seeks and is granted authority to administer the Part 503 regulations by EPA, treatment works treating domestic sewage should continue to work directly with EPA to comply with them. For more information, you can call the EPA Region III office in Philadelphia at 215-814-5735.

Please note that if this permit is to be reissued in five years, there are specific testing requirements associated with the Form 2A reissuance application that are different from the testing requirements in your permit. In order to provide the necessary data for Form 2A you may need to begin additional sampling during the term of this permit prior to receiving a reissuance reminder letter from this agency. Please look at Form 2A Part D (Expanded Effluent Testing Data) and Part E (Toxicity Testing Data) for the sampling requirements. Please note that DEQ and EPA will no longer accept waiver requests from the sampling or testing requirements in the application forms.

As provided by Rule 2A:2 of the Supreme Court of Virginia, you have thirty days from the date of service (the date you actually received this decision or the date it was mailed to you, whichever occurred first) within which to appeal this decision by filing a notice of appeal in accordance with the Rules of the Supreme Court of Virginia with the Director, Department of Environmental Quality. In the event that this decision is served on you by mail, three days are added to that period.

VA0021172
Final Permit to Facility
11 July 2016
Page 2 of 2

Alternately, any owner under §§ 62.1-44.16, 62.1-44.17, and 62.1-44.19 of the State Water Control Law aggrieved by any action of the State Water Control Board taken without a formal hearing, or by inaction of the Board, may demand in writing a formal hearing of such owner's grievance, provided a petition requesting such hearing is filed with the Board. Said petition must meet the requirements set forth in §1.23(b) of the Board's Procedural Rule No. 1. In cases involving actions of the Board, such petition must be filed within thirty days after notice of such action is mailed to such owner by certified mail.

A Reliability Class I is assigned to this facility and this facility has Class I licensed operator requirements.

Please contact Douglas Frasier at 703-583-3873 or via email at Douglas.Frasier@deq.virginia.gov should you have any questions concerning the permit.

Respectfully,



Jr Bryant Thomas
Regional Water Permits & Planning Manager

Enc.: Permit for VA0021172
Fact Sheet for VA0021172

cc: DEQ-Water, OWPP
EPA-Region III, 3WP12
Department of Health, Culpeper
Water Compliance, NRO
Allen Chichester, Wastewater Superintendent via achichester@warrentonva.gov

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Northern Regional Office
13901 Crown Court
Woodbridge
VA 22193

Permittee Name/Address (include facility name/location if different)
Warrenton Town Sewage Treatment Plant
Town of Warrenton
Warrenton VA 20186

Permit Number: VA0021172
Discharge Number: 801
Monitoring Period: Year: , MO: , DAY: TO Year: , MO: , DAY:

Name: Warrenton Town Sewage Treatment Plant
Address: Town of Warrenton, Warrenton VA 20186
Facility Location: 731 Frost Ave

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER	QUANTITY OR LOADING			QUALITY OR CONCENTRATION			NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
	AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM			
672 SOLIDS, TOTAL, SLUDGE AS PERCENT	*****	*****		*****					
	*****	*****		*****	NA		1/3M	COMP	
680 ARSENIC, SLUDGE	*****	*****		*****	41	75	MG/KG	1/3M	COMP
	*****	*****		*****	75	75	MG/KG	1/3M	COMP
681 MOLYBDENUM, SLUDGE	*****	*****		*****	2800	7500	MG/KG	1/3M	COMP
	*****	*****		*****	300	840	MG/KG	1/3M	COMP
682 ZINC, SLUDGE	*****	*****		*****	420	420	MG/KG	1/3M	COMP
	*****	*****		*****	17	57	MG/KG	1/3M	COMP
683 LEAD, SLUDGE	*****	*****		*****	1500	4300	MG/KG	1/3M	COMP
	*****	*****		*****					
684 NICKEL, SLUDGE	*****	*****		*****					
	*****	*****		*****					
685 MERCURY, SLUDGE	*****	*****		*****					
	*****	*****		*****					
686 COPPER, SLUDGE	*****	*****		*****					
	*****	*****		*****					

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS

TOTAL OCCURRENCES		TOTAL FLOW(M.G.)		TOTAL BOD(K.G.)		OPERATOR IN RESPONSIBLE CHARGE			DATE		
BYPASSES AND OVERFLOWS						TYPED OR PRINTED NAME			SIGNATURE		
						PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT			TELEPHONE		
						TYPED OR PRINTED NAME			SIGNATURE		
						TYPED OR PRINTED NAME			SIGNATURE		

I, CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHEMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY OBTAIN AND EVALUATE THE INFORMATION SUBMITTED, BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR OBTAINING THE INFORMATION, THE INFORMATION IS ACCURATE AND COMPLETE, I AM AWARE THAT FALSIFYING AND BEING TRUE, ACCURATE AND COMPLETE, I AM AWARE THAT FALSIFYING THE SIGNIFICANT RESULTS FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR BREACHING VIOLATIONS.

COMMONWEALTH OF VIRGINIA
 DEPARTMENT OF ENVIRONMENTAL QUALITY
 (REGIONAL OFFICE)

Municipal Major 07/05/2016
 DEPT. OF ENVIRONMENTAL QUALITY
 (REGIONAL OFFICE)
 Northern Regional Office
 13901 Crown Court
 Woodbridge VA 22193

PERMITTEE NAME/ADDRESS (INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)
 Warrenton Town Sewage Treatment Plant
 Town of Warrenton VA 20186
 731 Frost Ave
 Warrenton

VA0021172
 PERMIT NUMBER
 601
 DISCHARGE NUMBER
 MONITORING PERIOD
 YEAR MO DAY TO

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER	QUANTITY OR LOADING			QUALITY OR CONCENTRATION			NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
	AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM			
687 CADMIUM, SLUDGE	*****	*****		*****	39	85		1/3M	COMP
688 LEVEL OF PATHOGEN REQUIREMENTS ACHIEVED	*****	*****		*****	*****	NL		1/3M	COMP
689 DESCRIPTION OF PATHOGEN OPTION USED	*****	*****		*****	*****	NL		1/3M	COMP
690 VECTOR ATTRACTION REDUCTION OPTION USED	*****	*****		*****	*****	NL		1/3M	COMP
697 SELENIUM, SLUDGE	*****	*****		*****	100	100		1/3M	COMP
REPORTD								*****	
REQRMNT								*****	
REPORTD								*****	
REQRMNT								*****	
REPORTD								*****	
REQRMNT								*****	
REPORTD								*****	
REQRMNT								*****	
REPORTD								*****	
REQRMNT								*****	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)	OPERATOR IN RESPONSIBLE CHARGE		DATE	
				TYPED OR PRINTED NAME	SIGNATURE	YEAR	MO. DAY
I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY OBTAIN AND EVALUATE THIS INFORMATION SUBMITTED. BASED ON MY KNOWLEDGE OF THE PERSON OR PERSONS WHO OPERATE THE SYSTEM OR THESE PERSONS DIRECTLY RESPONSIBLE FOR OBTAINING AND VERIFYING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.				PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE	
				TYPED OR PRINTED NAME		SIGNATURE	

Municipal Major 07/05/2016
 DEPT. OF ENVIRONMENTAL QUALITY
 (REGIONAL OFFICE)
 Northern Regional Office
 13901 Crown Court
 Woodbridge VA 22193

COMMONWEALTH OF VIRGINIA
 DEPARTMENT OF ENVIRONMENTAL QUALITY
 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
 DISCHARGE MONITORING REPORT(DMR)

VA00231172	SPL				
PERMIT NUMBER	DISCHARGE NUMBER				
MONITORING PERIOD					
YEAR	MO	DAY	YEAR	MO	DAY
			TO		

NAME Warrenton Town Sewage Treatment Plant.
 ADDRESS Town of Warrenton VA 20186
 FACILITY LOCATION 731 Frost Ave

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS
 BEFORE COMPLETING THIS FORM.

FROM

PARAMETER	QUANTITY OR LOADING		QUALITY OR CONCENTRATION			NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
	AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE			
691 ANNUAL AMT SLUDGE DISPOSED BY OTHER MTD	REPORTD ***** REQRMNT *****	NL	MTRYR	***** ***** *****	***** ***** *****		1/3M	CALC
692 ANNUAL AMT SLUDGE INCINERATED	REPORTD ***** REQRMNT *****	NL	MTRYR	***** ***** *****	***** ***** *****		1/3M	CALC
693 ANNUAL SLUDGE PRODUCTION TOTAL	REPORTD ***** REQRMNT *****	NL	MTRYR	***** ***** *****	***** ***** *****		1/3M	CALC
694 ANNUAL AMT SLUDGE LAND APPLIED	REPORTD ***** REQRMNT *****	NL	MTRYR	***** ***** *****	***** ***** *****		1/3M	CALC
696 ANNUAL AMT SLUDGE DISPOSED IN LANDFILL	REPORTD ***** REQRMNT *****	NL	MTRYR	***** ***** *****	***** ***** *****		1/3M	CALC
	REPORTD						*****	
	REQRMNT						*****	
	REPORTD						*****	
	REQRMNT						*****	
	REPORTD						*****	
	REQRMNT						*****	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)	OPERATOR IN RESPONSIBLE CHARGE		DATE	
				TYPED OR PRINTED NAME	SIGNATURE	YEAR	MO. DAY
I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY IMPACT OF THE PERMITS OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR VIOLATIONS.				PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	TELEPHONE	CERTIFICATE NO.	
				TYPED OR PRINTED NAME	SIGNATURE	YEAR	MO. DAY

This report is required by your VPDES permit and by law. (See, e.g., the Code of Virginia of 1960 §62.1-44.5 and 9 VAC 25-31-50.) Failure to report or failure to report truthfully can result in civil penalties of \$3,500 per violation, per day and felony prosecutions which can carry a 16 year term.

DISCHARGE MONITORING REPORT (DMR) - GENERAL INSTRUCTIONS

1. Complete this form in permanent ink or indelible pencil. The use of 'correction fluid/tape' is not allowed.
2. Be sure to enter the dates for the first and last day of the period covered by the report on the form in the space marked "Monitoring Period".
3. For those parameters where the "permit requirement" spaces have a requirement or limitation, provide data in the "reported" spaces in accordance with your permit.
4. Enter the average and maximum quantities and units in the "reported" spaces in the columns marked "Quantity or Loading".
KG/DAY = Concentration (mg/L) x Flow (MGD) x 3.785 G/D (Grams/Day) = Concentration (mg/L) x Flow (MGD) x 3785
5. Enter maximum, minimum, and/or average concentrations and units in the "reported" spaces in the columns marked "Quality or Concentration".
6. For all parameters enter the number of samples which do not comply with the maximum and/or minimum permit requirements in the "reported" space in the column marked "No. Ex." (Number of Exceedances). If none, enter "0". Do NOT include monthly average violations in this field. Include any Maximum 7-Day Average and Maximum Weekly Average violations in this field. Permittees with continuous pH, or temperature monitoring requirements should consult the permit for what constitutes an exceedance and report accordingly.
7. You are required to sample (at a minimum) according to the Sample Frequencies and Sample Types specified in your permit.
8. Enter the actual frequency of analysis for each parameter (number of times per day, week, month, etc.) in the "reported" space in the column marked "Frequency of Analysis".
9. Enter the actual type of sample (Grab, 8HC, 24HC, etc) collected for each parameter in the "reported" space in the column marked "Sample Type".
10. Enter additional required data or comments in the space marked "additional permit requirements or comments". If additional required data or comments are appended to the DMR, reference appended correspondence in this field.
11. Record the number of bypasses during the month, the total flow in million gallons (MG) and BOD5 in kilograms (KG) in the proper columns in the section marked "Bypasses and Overflows".
12. The operator in responsible charge of the facility should review the form and sign in the space provided. If the plant is required to have a licensed operator or if the operator in responsible charge of the facility is a licensed operator, the operator's signature and certificate number must be reported in the spaces provided.
13. The principal executive officer then reviews the form and must sign in the space provided and provide a telephone number where he/she can be reached. Every page of the DMR must have an original signature.
14. Send the completed form(s) with original signatures to your Department of Environmental Quality Regional Office by the 10th of each month unless otherwise specified in the permit.
15. You are required to retain a copy of the report for your records.
16. Where violations of permit requirements are reported, attach a brief explanation in accordance with the permit requirements describing causes and corrective actions taken. Reference each separate violation by date.
17. If you have any questions, contact the Department of Environmental Quality Regional Office listed on the DMR.



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Permit No. VA0021172
Effective Date: August 1, 2016
Expiration Date: July 31, 2021

AUTHORIZATION TO DISCHARGE UNDER THE VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM AND THE VIRGINIA STATE WATER CONTROL LAW

In compliance with the provisions of the Clean Water Act as amended and pursuant to the State Water Control Law and regulations adopted pursuant thereto, the following owner is authorized to discharge in accordance with the information submitted with the permit application, and with this permit cover page, Part I – Effluent Limitations and Monitoring Requirements, Part II – Conditions Applicable To All VPDES Permits and Part III – Biosolids Conditions and Requirements, as set forth herein.

Owner Name: Town of Warrenton
Facility Name: Town of Warrenton Wastewater Treatment Plant
County: Fauquier
Facility Location: 731 Frost Avenue, Warrenton, VA 20186

The owner is authorized to discharge to the following receiving stream:

Stream Name: Great Run, UT
River Basin: Rappahannock River
River Subbasin: None
Section: 4
Class: III
Special Standards: None

A handwritten signature in cursive script, reading "Thomas A. Faha".

Thomas A. Faha
Director, Northern Regional Office
Department of Environmental Quality

July 11, 2016
Date

A. Effluent Limitations and Monitoring Requirements
Outfall 001 – 2.5 MGD Facility

1. There shall be no discharge of floating solids or visible foam in other than trace amounts.
2. This facility has Total Nitrogen and Total Phosphorus calendar year load limits associated with this outfall included in the current Registration List under registration number VAN020028, enforceable under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Dischargers and Nutrient Trading in the Chesapeake Watershed in Virginia.
3. During the period beginning with the permit's effective date and lasting until the expiration date, the permittee is authorized to discharge from Outfall Number 001. Such discharges shall be limited and monitored by the permittee as specified below.

Parameter	Discharge Limitations				Monitoring Requirements			
	Monthly Average ⁽¹⁾		Weekly Average ⁽¹⁾		Minimum	Maximum ⁽¹⁾	Frequency	Sample Type
Flow ⁽²⁾ (MGD)	NL		NA		NA	NL	Continuous	TIRE
pH	NA		NA		6.0 S.U.	9.0 S.U.	1/D	Grab
Biochemical Oxygen Demand (BOD ₅) ⁽²⁾	10 mg/L	95 kg/day	15 mg/L	140 kg/day	NA	NA	4D/W ⁽³⁾	24H-C
Total Suspended Solids (TSS) ⁽²⁾⁽⁴⁾	10 mg/L	95 kg/day	15 mg/L	140 kg/day	NA	NA	4D/W ⁽³⁾	24H-C
Dissolved Oxygen	NA		NA		6.5 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	NL mg/L		NL mg/L		NA	NA	1/W	24H-C
Ammonia, as N	1.4 mg/L		1.7 mg/L		NA	NA	4D/W ⁽³⁾	24H-C
<i>E. coli</i> (Geometric Mean) ⁽⁵⁾	126 n/100 mL		NA		NA	NA	1/D	Grab
NO ₂ + NO ₃ as Nitrogen	NL mg/L		NA		NA	NA	1/W	24H-C
Total Nitrogen ⁽⁶⁾	NL mg/L		NA		NA	NA	1/W	Calculated
Total Nitrogen – Year to Date ⁽⁷⁾	NL mg/L		NA		NA	NA	1/M	Calculated
Total Nitrogen – Calendar Year ⁽⁷⁾	4.0 mg/L		NA		NA	NA	1/YR	Calculated
Total Phosphorus	NL mg/L		NA		NA	NA	1/W	24H-C
Total Phosphorus – Year to Date ⁽⁷⁾	NL mg/L		NA		NA	NA	1/M	Calculated
Total Phosphorus – Calendar Year ⁽⁷⁾	0.3 mg/L		NA		NA	NA	1/YR	Calculated
Chronic Toxicity – <i>C. dubia</i> ⁽⁸⁾	NA		NA		NA	NL TU _c	1/YR	24H-C
Chronic Toxicity – <i>P. promelas</i> ⁽⁸⁾	NA		NA		NA	NL TU _c	1/YR	24H-C

- ⁽¹⁾ See Part I.B.
⁽²⁾ The design flow is 2.5 MGD.
⁽³⁾ At least 85% removal for BOD₅ and TSS shall be attained.
⁽⁴⁾ TSS shall be expressed as two significant figures.
⁽⁵⁾ Between 10 AM and 4 PM.
⁽⁶⁾ Total Nitrogen is the sum of Total Kjeldahl Nitrogen and NO₂+NO₃ Nitrogen and shall be calculated from the results of those tests.
⁽⁷⁾ See Part I.B.3. for nutrient reporting calculations.
⁽⁸⁾ See Part I.D. for toxicity monitoring requirements.
⁽⁹⁾ See Part I.E.10.
- MGD = Million gallons per day.
 NA = Not applicable.
 NL = No limit; monitor and report.
 S.U. = Standard units.
 TIRE = Totalizing, indicating and recording equipment.
- 1/D = Once every day.
 4D/W = Four days per week.
 1/W = Once per week.
 1/M = Once every month.
 1/YR = Once every calendar year.

24H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of twenty-four (24) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum of twenty-four (24) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

B. Quantification Levels and Compliance Reporting

1. Quantification Levels

- a. The quantification levels (QL) shall be less than or equal to the following concentrations:

<u>Characteristic</u>	<u>Quantification Level</u>
Total Suspended Solids (TSS)	1.0 mg/L
Biochemical Oxygen Demand-5 day (BOD ₅)	2 mg/L
Ammonia, as N	0.20 mg/L
Total Kjeldahl Nitrogen (TKN)	0.50 mg/L

- b. The QL is defined as the lowest concentration used to calibrate a measurement system in accordance with the procedures published for the method. It is the responsibility of the permittee to ensure that proper quality assurance/quality control (QA/QC) protocols are followed during the sampling and analytical procedures. QA/QC information shall be documented to confirm that appropriate analytical procedures have been used and the required QLs have been attained. The permittee shall use any method in accordance with Part II.A of this permit.

2. Compliance Reporting for Parameters in Part I.A.

- a. **Monthly Average** – Compliance with the monthly average limitations and/or reporting requirements for the parameters listed in Part I.B.1.a. of this permit condition shall be determined as follows: All concentration data below the QL used for the analysis (QL must be less than or equal to the QL listed in Part I.B.1.a above) shall be treated as zero. All concentration data equal to or above the QL used for the analysis shall be treated as reported. An arithmetic average shall be calculated using all reported data for the month, including the defined zeros. This arithmetic average shall be reported on the Discharge Monitoring Report (DMR) as calculated. If all data are below the QL used for the analysis, then the average shall be reported as "< QL". If reporting for quantity is required on the DMR and the reported monthly average concentration is < QL, then report "< QL" for the quantity. Otherwise, use the reported concentration data (including the defined zeros) and flow data for each sample day to determine the daily quantity and report the monthly average of the calculated daily quantities.
- b. **Weekly Average** – Compliance with the weekly average limitations and/or reporting requirements for the parameters listed in Part I.B.1.a. of this permit condition shall be determined as follows: All concentration data below the QL used for the analysis (QL must be less than or equal to the QL listed in Part I.B.1.a above) shall be treated as zero. All concentration data equal to or above the QL used for the analysis shall be treated as reported. An arithmetic average shall be calculated using all reported data, including the defined zeros, collected within each complete calendar week and entirely contained within the reporting month. The maximum value of the weekly averages thus determined shall be reported on the DMR. If all data are below the QL used for the analysis, then the weekly average shall be reported as "< QL". If reporting for quantity is required on the DMR and the reported weekly average concentration is < QL, then report "< QL" for the quantity. Otherwise use the reported concentration data (including the defined zeros) and flow data for each sample day to determine the daily quantity and report the maximum weekly average of the calculated daily quantities.
- c. **Single Datum** – Any single datum required shall be reported as "< QL" if it is less than the QL used in the analysis (QL must be less than or equal to the QL listed in Part I.B.1.a above). Otherwise the numerical value shall be reported.
- d. **Significant Digits** – The permittee shall report at least the same number of significant digits as the permit limit for a given parameter. Regardless of the rounding convention used by the permittee (i.e. 5 always rounding up or to the nearest even number), the permittee shall use the convention consistently and shall ensure that consulting laboratories employed by the permittee use the same convention.

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3. Nutrient Reporting Calculations for Part I.A.

- a. For each calendar month, the DMR shall show the calendar year-to-date average concentration (mg/L) calculated in accordance with the following formulae:

$$MC_{avg}\text{-YTD} = (\sum_{(Jan\text{-current month})} MC_{avg}) \div (\# \text{ of months})$$

where: $MC_{avg}\text{-YTD}$ = calendar year-to-date average concentration (mg/L)
 MC_{avg} = monthly average concentration (mg/L) as reported on DMR

- b. The total nitrogen and phosphorus average concentrations (mg/L) for each calendar year (AC) shall be shown on the December DMR due January 10th of the following year. These values shall be calculated in accordance with the following formulae:

$$AC_{avg} = (\sum_{(Jan\text{-Dec})} MC_{avg}) \div 12$$

where: AC_{avg} = calendar year average concentration (mg/L)
 MC_{avg} = monthly average concentration (mg/L) as reported on DMR

- c. For total phosphorus, all daily concentration data below the quantification level (QL) for the analytical method used should be treated as half the QL. All daily concentration data equal to or above the QL for the analytical method used shall be treated as it is reported.
- d. For total nitrogen (TN), if none of the daily concentration data for the respective species (i.e. TKN, Nitrates/Nitrites) are equal to or above the QL for the respective analytical methods used, the daily TN concentration value reported shall equal one half of the largest QL used for the respective species. If one of the data is equal to or above the QL, the daily TN concentration value shall be treated as that data point is reported. If more than one of the data is above the QL, the daily TN concentration value shall equal the sum of the data points as reported.

C. Pretreatment Requirements

Within 180 days of the effective date of this permit, the permittee shall submit written verification to the Department of Environmental Quality, Northern Regional Office (DEQ-NRO) that the Industrial User Survey (IU Survey) is current and no potential significant industrial users (SIUs) discharge to the POTW.

1. If potential SIUs are not identified, the permittee is not required to implement a pretreatment program. The requirements for program development described below may be suspended by the DEQ.
2. If Categorical Industrial User(s) (CIUs) are identified, or if the permittee or DEQ determines that any IU has potential to adversely affect the operation of the POTW or cause violation(s) of federal, state, or local standards or requirements, the permittee shall develop and submit to DEQ-NRO within one year of written notification by DEQ a pretreatment program for approval. The program shall enable the permittee to control by permit the SIUs discharging wastewater to the treatment works.
3. The approvable pretreatment program submission shall at a minimum contain the following parts:
 - a. The legal authority;
 - b. Program procedures;
 - c. Funding and resources;
 - d. A local limits evaluation and local limits if needed;
 - e. An Enforcement Response Plan, and

f. A list of SIUs.

A SIU is defined as an IU that:

- 1) Has an average flow of 25,000 gallons or more per day of process wastewater to exclude sanitary, non-contact cooling water and boiler blowdown;
 - 2) Contributes a process wastestream which makes up 5.0% or more of the average dry weather hydraulic or organic capacity of the POTW;
 - 3) Is subject to the categorical pretreatment standards; or
 - 4) Has significant impact, either singularly or in combination with other significant dischargers, on the treatment works or the quality of its effluent.
4. Where the permittee is required to develop a pretreatment program, they shall submit to DEQ-NRO an annual report no later than January 31 of each year that includes:
- a. An updated list of the SIUs noting all of the following:
 - 1) Facility address, phone and contact name;
 - 2) An explanation regarding SIUs deleted from the previous year's list;
 - 3) Identification of IUs subject to Categorical Standards and notation of application standard (e.g., metal finishing);
 - 4) Specification of applicable 40 CFR Part(s);
 - 5) Indication of IUs subject to local standards that are more stringent than Categorical Pretreatment Standards;
 - 6) Indication of IUs subject only to local requirements
 - 7) Identification of IUs subject to Categorical Pretreatment Standards that are also subject to reduced reporting requirements under 9VAC25-31-840 E.3.; and
 - 8) Identification of IUs that are non-significant CIUs.
 - b. A summary of the compliance status of each SIU with pretreatment standards and permit requirements;
 - c. A summary of the number and types of SIU sampling and inspections performed by the POTW;
 - d. All information concerning any interference, upset, VPDES permit or water quality standards violations directly attributable to SIUs and enforcement actions taken to alleviate said events;
 - e. A description of all enforcement actions taken against SIUs over the previous 12 months;
 - f. A summary of any changes to the submitted pretreatment program that have not been previously reported to DEQ-NRO;
 - g. A summary of the permits issued to SIUs since the last annual report;
 - h. POTW and self-monitoring results for SIUs determined to be in significant non-compliance during the reporting period;
 - i. Results of the POTW's influent/effluent/sludge sampling that have not been previously submitted to DEQ;

- j. Copies of newspaper publications of all SIUs in significant non-compliance during the reporting period to be due no later than March 31 of each year; and
 - k. The signature of an authorized representative.
5. The DEQ may require the POTW to institute changes to the legal authority regarding SFU permit(s):
- a. If the legal authority does not meet the requirements of the Clean Water Act, Water Control Law or State regulations;
 - b. If problems such as interferences, pass-through, violations of water quality standards or sludge contamination develop or continue; and
 - c. If federal, state or local requirements change.

D. Whole Effluent Toxicity Program Requirements

1. Biological Monitoring

- a). In accordance with the schedule in Part I.D.2. below, the permittee shall conduct annual chronic toxicity tests during this permit term. The permittee shall collect 24-hour flow-proportioned composite samples of final effluent at Outfall 001.

The chronic tests to use are:

Chronic 3-Brood Static Renewal Survival and Reproduction Test using *Ceriodaphnia dubia*

Chronic 7-Day Static Renewal Survival and Growth Test using *Pimephales promelas*

These chronic tests shall be conducted in such a manner and at sufficient dilutions (minimum of five dilutions) to determine the "No Observed Effect Concentration" (NOEC) for survival and reproduction or growth. Results which cannot be quantified (i.e. a "less than" NOEC value) are not acceptable and a retest shall be performed. The NOEC, as determined by hypothesis testing, shall be converted to TU_c (Chronic Toxic Units) for Discharge Monitoring Report (DMR) reporting where $TU_c = 100/NOEC$. Report the LC_{50} at 48 hours and the IC_{25} with the NOEC's in the test report.

- b). The permittee may provide additional samples to address data variability. These data shall be reported. Test procedures and reporting shall be in accordance with the WET testing methods cited in 40 CFR 136.3.
- c). The test dilutions shall be able to determine compliance with the following endpoints:

Chronic NOEC $\geq 69\%$; equivalent to a $TU_c \leq 1.44$

- d). The test data will be evaluated statistically for reasonable potential at the conclusion of the test period. The data may be evaluated sooner if requested by the permittee or if toxicity has been noted. Should evaluation of the data indicate that a limit is warranted, a WET limit and compliance schedule will be required.
- e). The permit may be modified or revoked and reissued to include pollutant specific limits in lieu of a WET limit should it be demonstrated that toxicity is due to specific parameters. The pollutant specific limitation shall control the toxicity of the effluent.

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2. Reporting Schedule

The permittee shall monitor during the specified period; shall report the results on the DMR; and shall supply one copy of the toxicity test report specified in this Whole Effluent Toxicity Program in accordance with the following schedule:

Period	Sampling Period	DMR/Report Submission Dates
Annual 1	April 1, 2017 – June 30, 2017	January 10, 2018
Annual 2	January 1, 2018 – March 31, 2018	January 10, 2019
Annual 3	July 1, 2019 – September 30, 2019	January 10, 2020
Annual 4	October 1, 2020 – December 31, 2020	January 10, 2021

E. Other Requirements and Special Conditions

1. 95% Capacity Reopener

A written notice and a plan of action for ensuring continued compliance with the terms of this permit shall be submitted to the DEQ-Northern Regional Office (DEQ-NRO) when the monthly average flow influent to the sewage treatment plant reaches 95% of the design capacity authorized in this permit for each month of any three consecutive month period. The written notice shall be submitted within 30 days and the plan of action shall be received at the DEQ-NRO no later than 90 days from the third consecutive month for which the flow reached 95% of the design capacity. The plan shall include the necessary steps and a prompt schedule of implementation for controlling any current or reasonably anticipated problem resulting from high influent flows. Failure to submit an adequate plan in a timely manner shall be deemed a violation of this permit.

2. Indirect Discharges

The permittee shall provide adequate notice to the Department of the following:

- a. Any new introduction of pollutants into the treatment works from an indirect discharger which would be subject to Section 301 or 306 of Clean Water Act and the State Water Control Law if it were directly discharging those pollutants; and
- b. Any substantial change in the volume or character of pollutants being introduced into the treatment works by a source introducing pollutants into the treatment works at the time of issuance of this permit.

Adequate notice shall include information on (i) the quality and quantity of effluent introduced into the treatment works, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the treatment works.

3. Operations and Maintenance Manual Requirement

The permittee shall maintain a current Operations and Maintenance (O&M) Manual for the treatment works that is in accordance with Virginia Pollutant Discharge Elimination System Regulations, 9VAC25-31 and Sewage Collection and Treatment Regulations, 9VAC25-790.

The O&M Manual and subsequent revisions shall include the manual effective date and meet Part II.K.2 and Part II.K.4 Signatory Requirements of the permit. Any changes in the practices and procedures followed by the permittee shall be documented in the O&M Manual within 90 days of the effective date of the changes. The permittee shall operate the treatment works in accordance with the O&M Manual and shall make the O&M manual available to Department personnel for review during facility inspections. Within 30 days of a request by DEQ, the current O&M Manual shall be submitted to the DEQ-NRO for review and approval.

The O&M Manual shall detail the practices and procedures which will be followed to ensure compliance with the requirements of this permit. This manual shall include, but not necessarily be limited to, the following items, as appropriate:

- a. Permitted outfall locations and techniques to be employed in the collection, preservation and analysis of effluent, storm water and sludge samples;
- b. Procedures for measuring and recording the duration and volume of treated wastewater discharged;
- c. Discussion of Best Management Practices, if applicable;
- d. Procedures for handling, storing and disposing of all wastes, fluids and that will prevent these materials from reaching state waters. List type and quantity of wastes, fluids and pollutants (e.g. chemicals) stored at this facility;
- e. Discussion of treatment works design, treatment works operation, routine preventative maintenance of units within the treatment works, critical spare parts inventory and record keeping;
- f. Plan for the management and/or disposal of waste solids and residues;
- g. Hours of operation and staffing requirements for the plant to ensure effective operation of the treatment works and maintain permit compliance;
- h. List of facility, local and state emergency contacts; and
- i. Procedures for reporting and responding to any spills/overflows/treatment works upsets.

4. Certificate to Construct/Certificate to Operate Requirements

In accordance with *Sewage Collection and Treatment* regulation (9VAC25-790), the permittee shall obtain a Certificate to Construct (CTC) and a Certificate to Operate (CTO) from the Department of Environmental Quality prior to constructing wastewater treatment works and operating the treatment works, respectively. Non-compliance with the CTC or CTO shall be deemed a violation of the permit.

5. Licensed Operator Requirement

The permittee shall employ or contract at least one Class I licensed wastewater works operator for this facility. The license shall be issued in accordance with Title 54.1 of the Code of Virginia and Board for Waterworks and Wastewater Works Operators and Onsite Sewage System Professionals Regulations. The permittee shall notify the Department in writing whenever he is not complying, or has grounds for anticipating he will not comply with this requirement. The notification shall include a statement of reasons and a prompt schedule for achieving compliance.

6. Reliability Class

The permitted treatment works shall meet Reliability Class I.

7. Water Quality Criteria Reopener

Should effluent monitoring indicate the need for any water quality-based limitations, this permit may be modified or alternatively revoked and reissued to incorporate appropriate limitations.

8. E3/E4

The annual average concentration limitations for total nitrogen and/or total phosphorus are suspended during any calendar year in which the facility is considered by DEQ to be a participant in the Virginia Environmental Excellence Program in good standing at either the Exemplary Environmental Enterprise (E3) level or the Extraordinary Environmental Enterprise (E4) level, provided that the following conditions have also been met:

- a. The facility has applied for (or renewed) participation, been accepted, maintained a record of sustained compliance and submitted an annual report according to the program guidelines;
- b. The facility has demonstrated that they have in place a fully implemented environmental management system (EMS) with an alternative compliance method that includes operation of installed nutrient removal technologies to achieve the annual average concentration limitations; and
- c. The E3/E4 designation from DEQ and implementation of the EMS has been in effect for the full calendar year.

The annual average concentration limitations for total nitrogen and/or total phosphorus, as applicable, are not suspended in any calendar year following a year in which the facility failed to achieve the annual average concentration limitations as required by b. above.

9. Nutrient Reopener

This permit may be modified or, alternatively, revoked and reissued:

- a. If any approved wasteload allocation procedure, pursuant to Section 303(d) of the Clean Water Act, imposes wasteload allocations, limits or conditions on the facility that are not consistent with the permit requirements;
- b. To incorporate technology-based effluent concentration limitations for nutrients in conjunction with the installation of nutrient control technology, whether by new construction, expansion or upgrade, or
- c. To incorporate alternative nutrient limitations and/or monitoring requirements, should:
 - 1) the State Water Control Board adopt new nutrient standards for the water body receiving the discharge, including the Chesapeake Bay or its tributaries; or
 - 2) a future water quality regulation or statute require new or alternative nutrient control.

10. Effluent Monitoring Frequency

If the facility permitted herein is issued a Notice of Violation for BOD₅, TSS or ammonia the effluent monitoring frequencies shall become revert back to 5D/W effective upon written notice from DEQ and remain in effect until permit expiration.

No other effluent limitations or monitoring requirements are affected by this special condition.

11. Collection System

The Town of Warrenton shall develop and implement a capacity, management, operation and maintenance (CMOM) program, or its equivalent, designed to maintain and operate Town owned collection system assets in accordance with industry accepted practices relating to sewer inspection, evaluation, repair and that all feasible steps are taken to eliminate excessive infiltration and inflow from the system.

The CMOM, or its equivalent, shall be submitted to DEQ-NRO staff for review and approval on or before 1 August 2017. Upon approval of the program and written notification from DEQ-NRO, an annual report shall be submitted thereafter on or before the 10th of August of every year detailing the previous fiscal year's activities/operations. The annual reports shall, at a minimum, provide the total amount funded to this program, studies/surveys conducted, completed rehabilitation projects and planned/proposed course of actions for the upcoming fiscal year.

12. Total Maximum Daily Load (TMDL) Reopener

This permit shall be modified or alternatively revoked and reissued if any approved wasteload allocation procedure, pursuant to Section 303(d) of the Clean Water Act, imposes wasteload allocations, limits or conditions on the facility that are not consistent with the permit requirements.

CONDITIONS APPLICABLE TO ALL VPDES PERMITS

A. Monitoring

1. Samples and measurements required by this permit shall be taken at the permit designated or approved location and be representative of the monitored activity.
 - a. Monitoring shall be conducted according to procedures approved under Title 40 Code of Federal Regulations Part 136 or alternative methods approved by the U.S. Environmental Protection Agency, unless other procedures have been specified in this permit.
 - b. The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will insure accuracy of measurements.
 - c. Samples taken shall be analyzed in accordance with 1VAC30-45, Certification for Noncommercial Environmental Laboratories, or 1VAC30-46, Accreditation for Commercial Environmental Laboratories.
2. Any pollutant specifically addressed by this permit that is sampled or measured at the permit designated or approved location more frequently than required by this permit shall meet the requirements in A 1 a through c above and the results of this monitoring shall be included in the calculations and reporting required by this permit.
3. Operational or process control samples or measurements shall not be taken at the designated permit sampling or measurement locations. Operational or process control samples or measurements do not need to follow procedures approved under Title 40 Code of Federal Regulations Part 136 or be analyzed in accordance with 1VAC30-45, Certification for Noncommercial Environmental Laboratories, or 1VAC30-46, Accreditation for Commercial Environmental Laboratories.

B. Records

1. Records of monitoring information shall include:
 - a. The date, exact place, and time of sampling or measurements;
 - b. The individual(s) who performed the sampling or measurements;
 - c. The date(s) and time(s) analyses were performed;
 - d. The individual(s) who performed the analyses;
 - e. The analytical techniques or methods used; and
 - f. The results of such analyses.
2. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years, the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to the permittee, or as requested by the Board.

C. Reporting Monitoring Results

1. The permittee shall submit the results of the monitoring required by this permit not later than the 10th day of the month after monitoring takes place, unless another reporting schedule is specified elsewhere in this permit.

Monitoring results shall be submitted to:

Department of Environmental Quality – Northern Regional Office (DEQ-NRO)
13901 Crown Court
Woodbridge, VA 22193

2. Monitoring results shall be reported on a Discharge Monitoring Report (DMR) or on forms provided, approved or specified by the Department.
3. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

D. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information which the Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Board may require the permittee to furnish, upon request, such plans, specifications, and other pertinent information as may be necessary to determine the effect of the wastes from this discharge on the quality of state waters, or such other information as may be necessary to accomplish the purposes of the State Water Control Law. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

E. Compliance Schedule Reports

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

F. Unauthorized Discharges

Except in compliance with this permit, or another permit issued by the Board, it shall be unlawful for any person to:

1. Discharge into state waters sewage, industrial wastes, other wastes, or any noxious or deleterious substances; or
2. Otherwise alter the physical, chemical or biological properties of such state waters and make them detrimental to the public health, or to animal or aquatic life, or to the use of such waters for domestic or industrial consumption, or for recreation, or for other uses.

G. Reports of Unauthorized Discharges

Any permittee who discharges or causes or allows a discharge of sewage, industrial waste, other wastes or any noxious or deleterious substance into or upon state waters in violation of Part II.F.; or who discharges or causes or allows a discharge that may reasonably be expected to enter state waters in violation of Part II.F., shall notify the Department of the discharge immediately upon discovery of the discharge, but in no case later than 24 hours after said discovery. A written report of the unauthorized discharge shall be submitted to the Department, within five days of discovery of the discharge. The written report shall contain:

1. A description of the nature and location of the discharge;
2. The cause of the discharge;
3. The date on which the discharge occurred;
4. The length of time that the discharge continued;
5. The volume of the discharge;
6. If the discharge is continuing, how long it is expected to continue;
7. If the discharge is continuing, what the expected total volume of the discharge will be; and

8. Any steps planned or taken to reduce, eliminate and prevent a recurrence of the present discharge or any future discharges not authorized by this permit.

Discharges reportable to the Department under the immediate reporting requirements of other regulations are exempted from this requirement.

H. Reports of Unusual or Extraordinary Discharges

If any unusual or extraordinary discharge including a bypass or upset should occur from a treatment works and the discharge enters or could be expected to enter state waters, the permittee shall promptly notify, in no case later than 24 hours, the Department by telephone after the discovery of the discharge. This notification shall provide all available details of the incident, including any adverse effects on aquatic life and the known number of fish killed. The permittee shall reduce the report to writing and shall submit it to the Department within five days of discovery of the discharge in accordance with Part II.I.2. Unusual and extraordinary discharges include but are not limited to any discharge resulting from:

1. Unusual spillage of materials resulting directly or indirectly from processing operations;
2. Breakdown of processing or accessory equipment;
3. Failure or taking out of service some or all of the treatment works; and
4. Flooding or other acts of nature.

I. Reports of Noncompliance

The permittee shall report any noncompliance which may adversely affect state waters or may endanger public health.

1. An oral report shall be provided within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which shall be reported within 24 hours under this paragraph:
 - a. Any unanticipated bypass; and
 - b. Any upset which causes a discharge to surface waters.
2. A written report shall be submitted within 5 days and shall contain:
 - a. A description of the noncompliance and its cause;
 - b. The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and
 - c. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The Board may waive the written report on a case-by-case basis for reports of noncompliance under Part II.I. if the oral report has been received within 24 hours and no adverse impact on state waters has been reported.

3. The permittee shall report all instances of noncompliance not reported under Parts II, I.1 or I.2., in writing, at the time the next monitoring reports are submitted. The reports shall contain the information listed in Part II.I.2.

NOTE: The immediate (within 24 hours) reports required in Parts II, G., H. and I. may be made to the Department's Northern Regional Office at (703) 583-3800 or online at <http://www.deq.virginia.gov/Programs/PollutionResponsePreparedness/MakingaReport.aspx>.

For reports outside normal working hours, leave a message and this shall fulfill the immediate reporting requirement. For emergencies, the Virginia Department of Emergency Services maintains a 24-hour telephone service at 1-800-468-8892.

J. Notice of Planned Changes

1. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:
 - a. The permittee plans alteration or addition to any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced:
 - 1) After promulgation of standards of performance under Section 306 of Clean Water Act which are applicable to such source; or
 - 2) After proposal of standards of performance in accordance with Section 306 of Clean Water Act which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal;
 - b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations nor to notification requirements specified elsewhere in this permit; or
 - c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.
2. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

K. Signatory Requirements

1. Applications. All permit applications shall be signed as follows:
 - a. For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
 - 1) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or
 - 2) The manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
 - b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
 - c. For a municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a public agency includes:
 - 1) The chief executive officer of the agency, or
 - 2) A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.

2. Reports, etc. All reports required by permits, and other information requested by the Board shall be signed by a person described in Part II.K.1., or by a duly authorized representative of that person. A person is a duly authorized representative only if:
 - a. The authorization is made in writing by a person described in Part II.K.1.;
 - b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and
 - c. The written authorization is submitted to the Department.
3. Changes to authorization. If an authorization under Part II.K.2. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part II.K.2. shall be submitted to the Department prior to or together with any reports, or information to be signed by an authorized representative.
4. Certification. Any person signing a document under Parts II, K.1. or K.2. shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

L. Duty to Comply

The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the State Water Control Law and the Clean Water Act, except that noncompliance with certain provisions of this permit may constitute a violation of the State Water Control Law but not the Clean Water Act. Permit noncompliance is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if this permit has not yet been modified to incorporate the requirement.

M. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall apply for and obtain a new permit. All permittees with a currently effective permit shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Board. The Board shall not grant permission for applications to be submitted later than the expiration date of the existing permit.

N. Effect of a Permit

This permit does not convey any property rights in either real or personal property or any exclusive privileges, nor does it authorize any injury to private property or invasion of personal rights, or any infringement of federal, state or local law or regulations.

O. State Law

Nothing in this permit shall be construed to preclude the institution of any legal action under, or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any other state law or regulation or under authority preserved by Section 510 of the Clean Water Act. Except as provided in permit conditions on "bypassing" (Part II.U.), and "upset" (Part II.V.) nothing in this permit shall be construed to relieve the permittee from civil and criminal penalties for noncompliance.

P. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Sections 62.1-44.34:14 through 62.1-44.34:23 of the State Water Control Law.

Q. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes effective plant performance, adequate funding, adequate staffing, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

R. Disposal of Solids or Sludges

Solids, sludges or other pollutants removed in the course of treatment or management of pollutants shall be disposed of in a manner so as to prevent any pollutant from such materials from entering state waters.

S. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

T. Need to Halt or Reduce Activity not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

U. Bypass

1. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts II, U.2. and U.3.
2. Notice
 - a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, prior notice shall be submitted, if possible at least ten days before the date of the bypass.
 - b. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Part II.I.
3. Prohibition of bypass.
 - a. Bypass is prohibited, and the Board may take enforcement action against a permittee for bypass, unless:
 - 1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

- 2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
 - 3) The permittee submitted notices as required under Part II.U.2.
- b. The Board may approve an anticipated bypass, after considering its adverse effects, if the Board determines that it will meet the three conditions listed above in Part II.U.3.a.

V. Upset

1. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of Part II.V.2. are met. A determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is not a final administrative action subject to judicial review.
2. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
 - a. An upset occurred and that the permittee can identify the cause(s) of the upset;
 - b. The permitted facility was at the time being properly operated;
 - c. The permittee submitted notice of the upset as required in Part II.I.; and
 - d. The permittee complied with any remedial measures required under Part II.S.
3. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

W. Inspection and Entry

The permittee shall allow the Director, or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act and the State Water Control Law, any substances or parameters at any location.

For purposes of this section, the time for inspection shall be deemed reasonable during regular business hours, and whenever the facility is discharging. Nothing contained herein shall make an inspection unreasonable during an emergency.

X. Permit Actions

Permits may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

Y. Transfer of permits

1. Permits are not transferable to any person except after notice to the Department. Except as provided in Part II.Y.2., a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued, or a minor modification made, to identify the new permittee and incorporate such other requirements as may be necessary under the State Water Control Law and the Clean Water Act.
2. As an alternative to transfers under Part II.Y.1., this permit may be automatically transferred to a new permittee if:
 - a. The current permittee notifies the Department at least 30 days in advance of the proposed transfer of the title to the facility or property;
 - b. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and
 - c. The Board does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in Part II.Y.2.b.

Z. Severability

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

BIOSOLIDS CONDITIONS AND REQUIREMENTS

A. Biosolids Limitations and Monitoring Requirements

During the period beginning with the permit's effective date and lasting until the permit expiration date, the permittee is authorized to manage biosolids in accordance with 9VAC25-31-420 through 720 and 9VAC25-32-303 through 358, the limitations, conditions and requirements set forth in this permit and the approved Biosolids Management Plan.

All biosolids samples shall be collected and analyzed in accordance with Title 40 of the Code of Federal Regulations, Part 503 and 136, and the approved Biosolids Management Plan. The permittee shall ensure that all biosolids generated under authority of this permit and distributed for the purpose of land application, blending or further treatment are monitored in accordance with the monitoring requirements as specified herein.

Class B Biosolids

1. Biosolids Annual Production Monitoring (SP1)

The permittee shall report the annual total amount of biosolids produced (in dry metric tons) and annual amount of Class B biosolids (in dry metric tons) distributed for land application.

Data shall be reported on the Discharge Monitoring Report (DMR) for discharge number SP1.

2. Biosolids Chemical Limitations and Monitoring Requirement (S01)

Pollutants in Class B biosolids that are generated and provided to a land applier under the authority of this permit shall be monitored and limited as specified below. Biosolids shall not be provided for land application if the concentration of any pollutant in the biosolids exceeds the ceiling limitation of that pollutant.

Biosolids Characteristic ⁽¹⁾	PC / CPLR Limitations ⁽¹⁾	Ceiling Limitations ⁽¹⁾	Monitoring Requirements	
	Monthly Average ⁽²⁾	Concentration Maximum ⁽²⁾	Frequency	Sample Type
Percent Solids (%)	NL	NA	1/3M	Composite
Arsenic, Sludge	41 mg/kg	75 mg/kg	1/3M	Composite
Cadmium, Sludge	39 mg/kg	85 mg/kg	1/3M	Composite
Copper, Sludge	1500 mg/kg	4300 mg/kg	1/3M	Composite
Lead, Sludge	300 mg/kg	840 mg/kg	1/3M	Composite
Mercury, Sludge	17 mg/kg	57 mg/kg	1/3M	Composite
Molybdenum, Sludge	NL	75 mg/kg	1/3M	Composite
Nickel, Sludge	420 mg/kg	420 mg/kg	1/3M	Composite
Selenium, Sludge	100 mg/kg	100 mg/kg	1/3M	Composite
Zinc, Sludge	2800 mg/kg	7500 mg/kg	1/3M	Composite

NA = Not applicable.
 NL = No limit; monitor and report.

1/3M = Once every calendar quarter.
 mg/kg = Milligrams per kilogram, dry weight.

⁽¹⁾ All parameters are subject to pollutant concentrations (PC), cumulative pollutant loading rates (CPLR), and ceiling limits. PC biosolids contain the constituents identified above at concentrations below the monthly average specified herein. CPLR biosolids contain the constituents identified above at concentrations above the monthly average and each sample must be below the maximum concentration specified herein.

⁽²⁾ All limits and criteria are expressed on a dry weight basis.

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3. Pathogen Reduction and Vector Attraction Reduction (VAR) Requirements (S01)

Biosolids generated and provided to a land applier under this permit shall be treated to meet a Class B Pathogen Reduction Alternative and one VAR Option 1 - 8 prior to delivery to the land application site. The Class B Biosolids shall be monitored and limited in accordance with the treatment options selected and used by the generator, as identified in the table below.

Treatment Option			
Pathogen Reduction Alternative	Process to Significantly Reduce Pathogens (PSRP) Option	Class B Pathogen Reduction & Vector Attraction Reduction (VAR) Treatment and Standards	Monitoring Requirements
2	3	PSRP: Anaerobic digestion for a mean cell residence time between 15 days at 35° C – 55° C up to 60 days at 20° C. (9VAC25-31-710.D.3.)	1/3M ^{(1) (2)}
VAR Option 1		The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38%, calculated according to the method in 9VAC25-31-490.B.8.	1/3M ^{(1) (2) (3)}

1/3M = Once every calendar quarter.

- ⁽¹⁾ Between sampling events, operating records must demonstrate that the Wastewater Treatment Plant (WWTP) is operating at a performance level known to meet pathogen reduction and VAR standards.
- ⁽²⁾ Process monitoring must be sufficient to demonstrate compliance with PSRP and VAR treatment requirements.
- ⁽³⁾ If the selected VAR option 1- 8 is not met, the permittee shall provide notification to the land applier at the time the biosolids are delivered that the biosolids did not meet VAR at the WWTP and that the biosolids must be injected below the surface of the land (9VAC25-31-720.B.9) or incorporated into the soil within 6 hours after application (9VAC25-31-720.B.10). The Permittee shall obtain verification from the land applier that injection or incorporation occurred.

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B. Biosolids Management and Reporting Requirements

1. Approved Biosolids Source Requirement

Only biosolids from a source that has been approved by the DEQ, as identified on the DEQ's *Sources of Biosolids, Industrial Sludges, WTP Residuals* list and treated to meet metals limits, pathogen reduction and VAR standards as set forth in Part III of this permit, shall be given to any person for the purpose of blending or land application.

2. Biosolids Monitoring Frequency and Reporting Requirements

a. Monitoring Frequency

The monitoring frequency shall be once per calendar quarter (1/3M). The monitoring frequency may be increased during this permit term upon written notification by DEQ if deemed necessary.

b. Annual Report

The permittee shall submit an Annual Report not later than February 19th of each year to the DEQ-Northern Regional Office. Each report is for the previous calendar year's activity. If no biosolids were generated and provided to a land applier under this permit during the reporting year, a report shall be submitted stating that no biosolids were generated or delivered during the year.

The report shall include at minimum:

1) Part III.A.1. Sewage Sludge Annual Production Monitoring;

2) Biosolids Monitoring Data:

a) Part III.A.2. Biosolids – Metals Limitations;

b) Part III.A.3. Biosolids – Pathogen Reduction and Vector Attraction Reduction (VAR) Requirements; and

c) Supporting documentation, including laboratory chain of custody forms and certificates of analyses, shall be submitted with the report;

3) A summary of biosolids disposal contracts, if any, currently held with other generators, as well as any other biosolids or sludges currently being handled through subcontracts or other agreements. Include biosolids or sludges given to other generators, contractors or land filled and biosolids or sludges accepted from other generators for treatment or land application;

4) Identify other methods used to dispose of or use biosolids or sludge produced during the previous calendar year. Report the annual total amount of biosolids or sludge (in dry metric tons) disposed of or used by each method identified; and

5) The annual report shall be certified and signed in accordance with Part II.K.

3. Record Keeping

The permittee is required to retain the following information for at least five years:

a. The concentrations of each pollutant in Parts III.A.2.;

b. A description of how the pathogen reduction requirements in Parts III.A.3. are met;

c. A description of how the vector attraction reduction requirements in Parts III.A.3. are met;

d. A description of how the management practices specified in the approved Biosolids Management Plan and this permit are met;

- e. The Notice and Necessary Information required in Part III.B.4; and
- f. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the Class B pathogen requirements in 9VAC25-31-710.B.6 and the vector attraction reduction requirements in 9VAC25-31-720.B.6 was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment".

4. Notice and Necessary Information (NANI)

A NANI shall be provided to any person to whom biosolids are provided for the purpose of further treatment, blending or land application. The NANI shall be provided at the time the biosolids are provided if available, but no later than 45 days after the last day of the month in which biosolids were provided. The NANI shall represent the most recent monitoring period.

The NANI shall include at a minimum:

- a. A statement that Class B pathogen requirements in 9VAC25-31-710.A – B were met and the alternative used;
- b. A statement that one of the VAR requirements in 9VAC25-31-720.B.1 through B.8 was met and the alternative used; or
- c. A statement that one of the VAR requirements in 9VAC25-31-720.B.1 through B.8 was not met and incorporation or injection was required;
- d. The notice(s) provided to the land applier when biosolids provided did not meet VAR and required incorporation or injection;
- e. The concentration of total nitrogen (as N on a dry weight basis) of the biosolids; and
- f. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the Class B pathogen requirements in 9VAC25-31-710.B and the VAR requirement in 9VAC25-31-720.B.6 was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification, including the possibility of fine and imprisonment".

5. Biosolids Management Plan (BSMP)

- a. The permittee shall conduct all biosolids/sewage sludge use or disposal activities in accordance with the Biosolids Management Plan approved with the issuance of this permit. The permittee shall maintain the BSMP which consists of the following components:
 - 1) The materials developed and submitted at the time of permit application or permit modification in accordance with 9VAC25-31-100.Q;
 - 2) The Operations and Maintenance (O&M) Manual (sections regarding solids handling and biosolids production and management, etc); and
 - 3) The Odor Control Plan (OCP).
- b. Odor Control Plan (OCP) Requirement – If an OCP is not on file at DEQ, an OCP shall be submitted to DEQ within 90 days of the effective date of this permit.

The OCP shall include at a minimum:

- 1) Methods used to minimize odor in producing biosolids;
 - 2) Methods used to identify malodorous biosolids before delivery to the land applier (at the generating facility);
 - 3) Methods used to identify and abate malodorous biosolids if delivered to the field, prior to land application;
and
 - 4) Methods used to abate malodor from biosolids if land applied.
- c. The BSMP and all of its components shall be incorporated by reference and is an enforceable part of this permit.
- d. Any proposed changes in the biosolids/sewage sludge use or disposal practices or procedures followed by the permittee shall be documented and submitted for DEQ-Northern Regional Office (DEQ-NRO) approval 90 days prior to the effective date of the changes. Upon approval, the revised Biosolids Management Plan becomes an enforceable part of the permit. The permit may be modified or alternatively revoked and reissued to incorporate limitations or conditions necessitated by substantive changes in biosolids/sewage sludge use or disposal practices.
6. Biosolids/Sludge Reopener

The Board may promptly modify or revoke and reissue this permit if any applicable standard for biosolids and/or sewage sludge use or disposal promulgated under Section 405(d) of the Clean Water Act is more stringent than any requirements for biosolids/sludge use or disposal in this permit, or controls a pollutant or practice not limited within this permit.

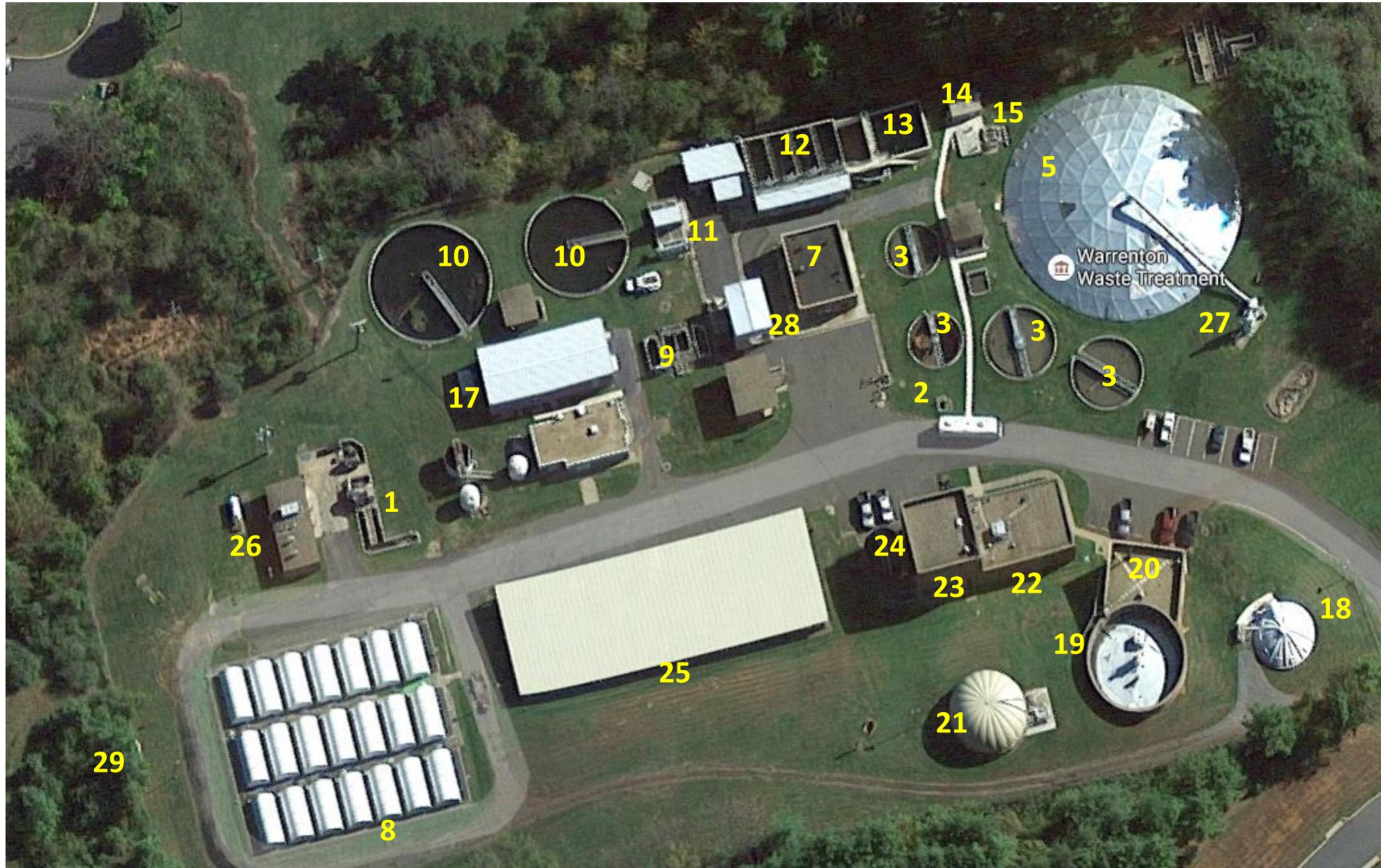
7. Biosolids Use and Disposal

The permittee shall conduct all biosolids use or disposal activities in accordance with the Biosolids Management Plan approved with the issuance of this permit. Any proposed changes in the biosolids use or disposal practices or procedures followed by the permittee shall be documented and submitted for DEQ-Northern Regional Office (DEQ-NRO) approval 90 days prior to the effective date of the changes. Upon approval, the revised Biosolids Management Plan shall be incorporated by reference and becomes an enforceable part of the permit. The permit may be modified or alternatively revoked and reissued to incorporate limitations or conditions necessitated by substantive changes in biosolids use or disposal practices.

Appendix B

Existing Aerial Site Plan





EXISTING FACILITIES

1. HEADWORKS
2. SPLITTER BOX
3. PRIMARY CLARIFIER
4. TF DOSING TANK
5. TRICKLING FILTER (TF)
6. JUNCTION BOX NO. 1
7. PLANT PUMP STATION
8. RBC UNITS
9. FLASH MIXER & FLOCCULATORS
10. SECONDARY CLARIFIER
11. DENITRIFICATION PUMP STATION
12. DENITRIFICATION FILTERS
13. DENITRIFICATION CLEARWELL
14. UV-FACILITY
15. PLANT UTILITY WATER PS
16. POST AERATION TANK
17. ELECTRICAL GENERATOR BLDG.
18. GRAVITY SLUDGE THICKENER
19. ANAEROBIC DIGESTER #1
20. DIGESTER BUILDING
21. ANAEROBIC DIGESTER #2
22. PLANT CONTROL BLDG
23. SLUDGE DEWATERING BLDG
24. FILTRATE EQ TANK
25. DEWATERED SLUDGE STORAGE
26. RBC BLOWER BUILDING
27. ODOR CONTROL FACILITY
28. METHANOL STORAGE

29. PLANNED MBBR FACILITY AREA

**WARRENTON WWTP
AERIAL PLAN**

Appendix C

Wastewater Sampling Data (2016 and 2006 data)



WARRENTON WWTP - WASTEWATER SAMPLING DATA (MARCH 2016)

Plant Influent

Date	Rainfall (inches)	Flow Avg (MGD)	Flow Max (MGD)	WW Temp (C)	BOD ₅ (mg/L)	TSS (mg/L)	Ammonia (mg/L)	TKN (mg/L)	TP (mg/L)	Alkalinity CaCO ₃ (mg/L)
2/29/2016	0	2.36	3.8	14.6	123	61	15	24	3.1	140
3/1/2016	0	2.23	3.6	13.1	134	66				
3/2/2016	0	2.14	2.9	14.2	295	137	17	24	2.2	
3/3/2016	0	2.17	3.2	13.3	191	105				
3/4/2016	0	2.10	2.9	13.4	125	45	21	29	3.2	152
3/5/2016	0	1.98	3.7	13.6	256	71				
3/6/2016	0	2.02	3.8	14.0	217	71	20	27	3.4	
3/7/2016	0	2.08	3.6	14.8	190	86				
3/8/2016	0	2.00	3.6	15.1	184	130	24	31	4.0	142
3/9/2016	0	1.94	3.5	15.6	181	62				
3/10/2016	0	1.94	3.7	17.1	250	144	21	34	4.4	
3/11/2016	0	1.81	3.3	17.1	158	81				
3/12/2016	0	1.80	3.2	16.5	204	89	15	31	4.1	144
3/13/2016	0.4	1.76	3.5	15.4	191	86				
Average		2.02	3.5	14.8	193	88	19	29	3.5	145

BFP Filtrate Holding Tank (ammonia sidestream)

Date	BOD ₅ (mg/L)	TSS (mg/L)	Ammonia (mg/L)	TKN (mg/L)
2/29/2016	25	33	287	307
3/4/2016	36	44	276	298
3/8/2016	49	823	336	412
3/12/2016	32	67	276	316
Average	36	242	294	333

Primary Influent (influent + filtrate)

Ammonia (mg/L)	TKN (mg/L)
23.2	33.3

Avg side stream flow (gpm): 20



WARRENTON WWTP - WASTEWATER SAMPLING DATA (MARCH 2016)

Influent ammonia sampling (plant lab analysis)

Date	Plant Lab*) NH3-N (mg/L)	Flow Avg (MGD)	Flow Max (MGD)	ESS Lab **) NH3-N (mg/L)
2/22/2016	18.3	2.32	3.5	
2/23/2016	18.2	2.51	3.6	
2/24/2016	13.0	3.21	6.0	
2/25/2016	11.0	3.32	4.2	
2/26/2016	11.1	2.90	3.3	
2/27/2016	13.1	2.44	3.5	
2/28/2016	11.0	2.36	3.8	
2/29/2016	18.4	2.36	3.8	15
3/1/2016	17.6	2.23	3.6	
3/2/2016	19.6	2.14	2.9	17
3/3/2016	18.6	2.17	3.2	
3/4/2016	20.3	2.10	2.9	21
3/5/2016	23.4	1.98	3.7	
3/6/2016	18.2	2.02	3.8	20
3/7/2016	18.6	2.08	3.6	
3/8/2016	17.2	2.00	3.6	24
3/9/2016	23.5	1.94	3.5	
3/10/2016	24.7	1.94	3.7	21
3/11/2016	27.4	1.81	3.3	
3/12/2016	15.7	1.80	3.2	15
3/13/2016	14.0	1.76	3.5	

 High flow period

*) Grab samples. Analysis completed daily at 5 PM.

**) Composite sample based on three (3) daily grab samples



**Town of Warrenton WWTP
Influent Wastewater Sampling Plan – 2016**

	Plant Influent ¹							BFP Filtrate Tank Ammonia Sidestream ²			
	BOD ₅	TSS	TKN	NH ₃	TP	Alka ³	pH	BOD ₅	TSS	TKN	NH ₃
Day Date											
1	X	X	X	X	X	X	X	X	X	X	X
2	X	X									
3	X	X	X		X						
4	X	X									
5	X	X	X	X	X	X	X	X	X	X	X
6	X	X									
7	X	X	X		X						
8	X	X									
9	X	X	X	X	X	X	X	X	X	X	X
10	X	X									
11	X	X	X		X						
12	X	X									
13	X	X	X	X	X	X	X	X	X	X	X
14	X	X									
Total Samples	14	14	7	4	7	43	4	4	4	4	4

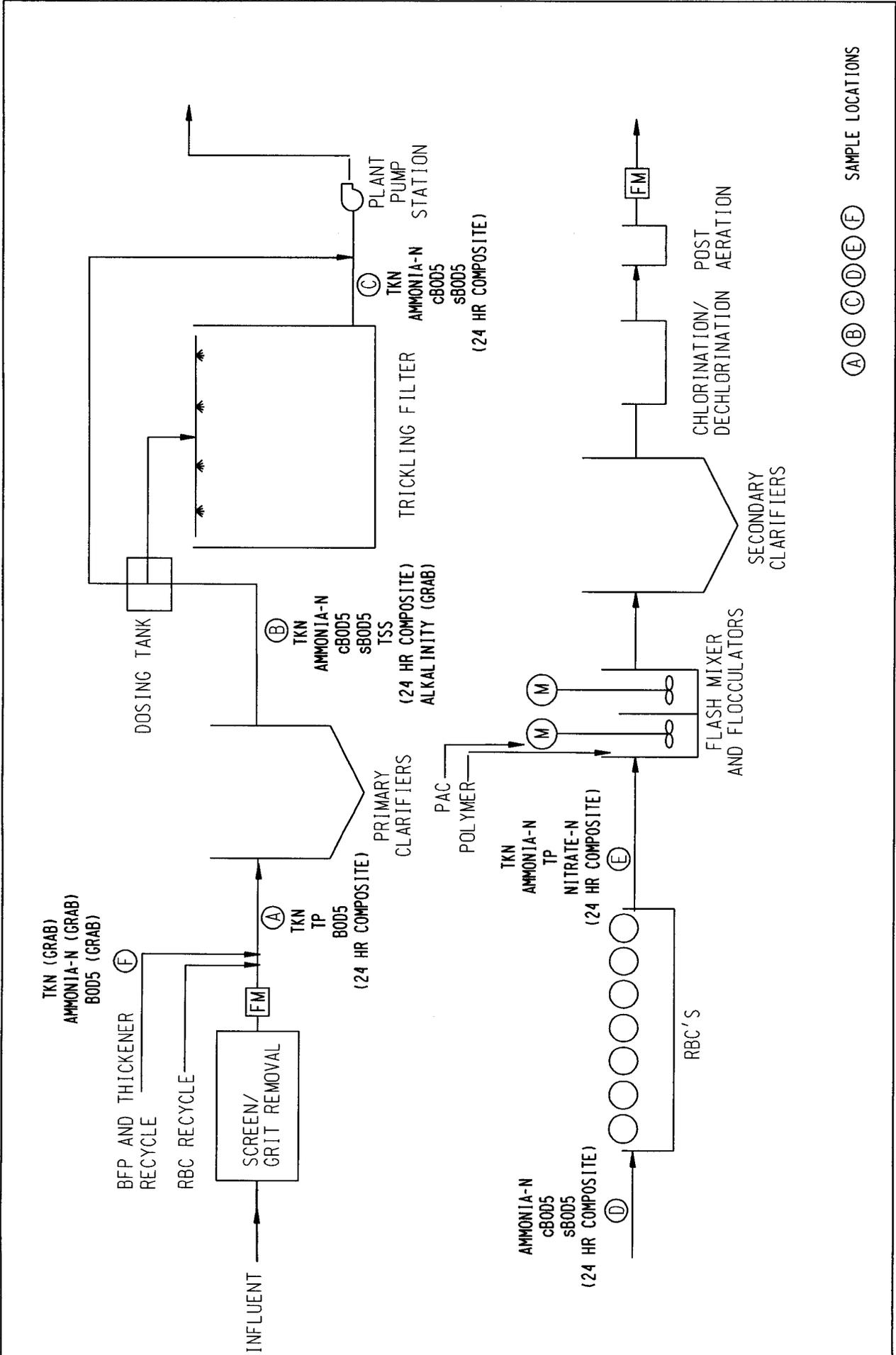
Notes:

1. Influent Sampling: One composite sample for analysis, based on three (3) discrete manual grab samples collected at 8AM, 4PM and 10PM. Influent samples shall be collected after the screen and grit removal, but before the influent flow meter (i.e. upstream of the location where the RBC recycle flows enters).
2. Holding Tank Sampling: One manual grab sample (no composite needed) when the tank is in draining mode.
3. Alkalinity measurements can be performed in-house at the WWTP lab.



Warrenton WWTP - Supplemental WW Sampling/Characterization (March 2006)																
Date March 2006	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Units	Average
Centrate TKN	215	206	183	173	174	156	145	202	197	183	181	193	187	192	mg/L	185
Centrate NH3-N	180	160	120	120	110	130	120	110	110	120	110	100	100	120	mg/L	122
Centrate BOD	LE	22	7	4	6	7	mg/L	9								
Primary Influent TKN	25	29.2	29.8	30.9	25.3	28.1	29	30.3	28.7	30.5	32.7	40	28.2	30.5	mg/L	30
Primary Influent TP	5.44	5.47	6.11	7.8	5.53	6.11	7.15	7.28	6.25	6.12	7.63	6.46	6.73	6.73	mg/L	6.5
Primary Influent BOD	182	157	92	LE	200	50	250	99	105	117	172	155	159	168	mg/L	147
Primary Effluent TKN	23.7	24.5	25.3	22.8	23.6	24.2	24.7	25	25.3	25.4	24	27.4	24	24.8	mg/L	25
Primary Effluent NH3-N	19	18	18	17	17	18	16	15	16	17	15	15	16	18	mg/L	17
Primary Effluent cBOD	111	126	91	116	117	113	119	117	106	121	119	119	81	101	mg/L	111
Primary Effluent sBOD	34	48	40	46	44	49	46	67	48	44	34	52	45	60	mg/L	47
Primary Effluent TSS	95	69	79	93	79	100	95	89	82	92	88	87	89	80	mg/L	87
Primary Effluent ALK	142	128	114	142	174	180	268	130	190	200	140	136	160	160	mg/L	162
Trickling Filter Effluent TKN	11.5	12.5	11.1	11.4	12.1	12.4	12.6	14.6	13.8	13.8	12.7	12.4	18	13.3	mg/L	13.0
Trickling Filter Effluent NH3-N	8.6	8.8	8.3	7	6.7	8	7.3	7.5	8	7.8	6.8	6.5	7.1	8	mg/L	7.6
Trickling Filter Effluent cBOD	15	15	11	24	36	16	23	47	17	19	19	17	13	13	mg/L	20
Trickling Filter Effluent sBOD	4	6	3	< 3	3	< 4	5	18	< 3	< 3	< 4	< 4	< 4	< 4	mg/L	6.5
RBC Influent NH3-N	10	10	10	8.8	7.6	8.9	9.2	8.6	8.8	8.6	7.6	7.8	7.1	8.2	mg/L	8.7
RBC Influent cBOD	24	23	7	25	19	20	25	36	11	21	22	19	11	15	mg/L	20
RBC Influent sBOD	4	< 3	3	< 3	< 3	< 4	< 3	10	< 3	< 3	< 4	< 4	< 4	< 4	mg/L	5.7
RBC Effluent TKN	5	5.96	5.73	6.74	6.46	5.34	6.18	8.15	5.62	8.17	7.05	6.77	7.05	7.31	mg/L	6.5
RBC Effluent NH3-N	0.17	0.16	0.16	0.17	0.15	0.12	0.16	0.15	0.2	0.21	0.14	0.11	0.11	0.1	mg/L	0.2
RBC Effluent TP	4.5	4.95	5.18	4.57	4.88	4.82	5.14	4.95	5.36	5.58	5.38	5.36	4.9	5.1	mg/L	5.0
RBC Effluent Nitrate-N	0.67	15.8	15.9	14.1	0.67	12.7	14.8	15.4	15.4	16.7	15.8	13.9	13.8	16.7	mg/L	13.0
LE Lab Error																





WARRENTON WASTEWATER TREATMENT PLANT	W.O.:	18245	DATE:	FEB 2006
	SCALE:	NONE	DWG. NO.:	
	FILE NAME: n:\18245\CADD\Process\process schemat Thu Feb 16 08:54:38 2006			
SAMPLING PLAN				

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